

# Mining and Engineering World







# The MINING WORLD

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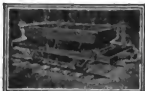
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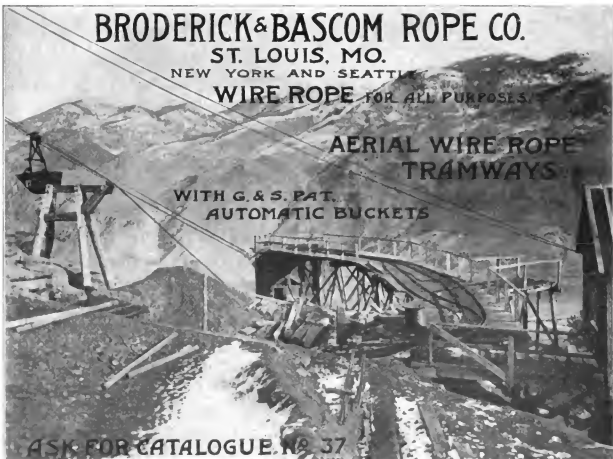
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\* Illustrated.

## Six Months' Mining Profits

The mining and metallurgical industries in the United States have just passed through six months of unusual depression, which has resulted in the cutting down of earnings and consequently of profit-sharing. Consumption and prices for silver, copper, lead, zinc and other products of mine, mill and smelter, since January have been the lowest for years, but an improvement is looked for during the closing months of the year.

Dividend payments for the first six months of 1908, according to a careful compilation by The Mining World, amounted to \$21,402,188, reported by 56 mines and metallurgical works in the United States. These 56 corporations have declared to date the enormous total of \$170,746,069 in dividends, showing that they have returned about 118% on their issued capitalization of \$308,668,380.

These large dividends, by the way, do not include the payments by mines and securities holding corporations like the Amalgamated Copper Co. From January to June, this year, four of these securities-holding concerns, incorporated within 1864, have declared dividends. The Amalgamated Copper Co., which is the largest of the four corporations, has paid this year dividends of \$1,338,879, equivalent to 1% on its issued share-capital, being at the rate of 0.5% quarterly on \$100 par value of stock. Since its incorporation in April, 1899, Amalgamated shareholders have collected dividends aggregating a total of \$55,696,261, on a capitalization which has been increased from \$75,000,000 to \$155,000,000, of which \$153,887,000 has been issued so far.

The American Smelters Securities Co., the second largest corporation of its class, pays quarterly dividends at the rate of 6% per annum on its \$17,000,000 preferred stock, and 5% on its \$30,000,000 B preferred stock. For the first half this year the total dividends were \$1,260,000, bringing the amount since organization in 1905 to \$7,815,000. This corporation is a grafted limb on the "smelter trust" family tree.

Copper dividends have been reduced alarmingly, owing to the peculiar situation of the metal market, which has put prices at a level that makes production unprofitable for many mines. For the past six months the dividends declared by 15 mines amounted to \$7,491,762, being only about one-quarter as large as the total for the corresponding period in 1907. To date these 15 copper mines have paid divi-

dividends of \$269,006,526 on an issued capitalization of \$76,525,000, indicating a return of about 390%. No wonder copper shares are in favor with investors and speculators alike.

Thirty-three gold, silver and lead mines paid \$4,309,051 in dividends for the first half this year, making a total of \$79,971,801 since their incorporation. This shows a return of about 82% on the outstanding capitalization of \$97,621,530. Most of the dividends declared by these 33 mines have been in small amounts at regular periods.

The six metallurgical works which reported dividends of \$9,548,775 for the half year, have declared to date the large total of \$90,752,652 on their issued capitalization of \$223,972,850. Foremost stands the American Smelting and Refining Co., which declared \$4,825,000 for the first six months this year, equivalent to 4% on the \$50,000,000 common stock and 51.4% on the \$50,000,000 preferred. The last quarterly dividends, however, were at the rate of 4% per annum on the common stock, and 7% on the preferred. Since its organization in April, 1899, the so-called "smelter trust" has paid dividends amounting to the large sum of \$43,206,544, besides sharing substantial profits among its employees.

The United States Smelting, Refining and Mining Co., incorporated in March, 1906, has mailed to the holders of its \$41,846,650 outstanding stock, dividends of \$5,458,222, of which \$1,802,041 were declared in the current year. The last quarterly dividend on the \$17,551,450 common stock was at the rate of 4% per annum on par, \$50, and that on the \$24,285,200 preferred stock, 7% per annum on par, \$50.

In addition to the dividends quoted above, large profits have been shared with investors in numerous private corporations. A source of increasing revenue to investors is the stock in metal selling concerns, as for instance, the United, which is affiliated with the Amalgamated Copper Co., and which has declared dividends since organization in January, 1906, the enormous total of \$6,500,000 on a \$5,000,000 capitalization. The dividends paid for the first half of the current year amounted to \$875,000, or 17 1/2%.

## The Guggenheim Finances.

For the president of the so-called smelter trust, the American Smelting & Refining Co., capitalized at \$100,000,000 and with dividends of \$43,206,543 to its credit, to announce that salaries (including those of the officials) have been cut and other economies made so as to effect a saving

of nearly \$1,000,000 per annum is interesting.

Considering, however, that this story emanated from Wall street, where truth is not a cardinal virtue, we may conveniently cut the \$1,000,000 "saved" in half, and perhaps a grain of salt might further reduce the original estimate.

Of late sensational news has been rather scarce in lower Broadway, and as the stock market is dull, the speculative interests in want of a tonic must needs incubate tales of fancy.

The fact that silver, copper and lead, the chief products of the "smelter trust" continue to be sold at the lowest prices in years, offers the opportunity to guess that the Guggenheims and their colleagues are being hard hit by the smaller earnings of the American Smelting & Refining Co. and its affiliated corporations. It is strange, however, that although the quarterly dividend on "smelter trust" common stock is one-half what it was a year ago, no change has been made in the guaranteed ~~percentage~~ of either the "smelter trust," American Smelters' Securities, and Guggenheim Exploration. It is also worthy of remark that the preferred ~~share~~ of these corporations are nearly all held by the Guggenheims and their business associates.

Believing for the purpose of argument that the Guggenheim income is at least 10%, perhaps 20%, less than it has been (not considering the depreciation in the market value of their shareholdings), and knowing of their heavy expenditures for new mining properties in Nevada, Utah, Alaska, Mexico, and elsewhere, we are still doubtful that their control of the "smelter trust" has passed into other hands.

Only a short time ago Mr. Daniel Guggenheim, who is president of the American Smelting & Refining Co., denied that the Standard Oil coterie had obtained dictative control of the "smelter trust." Be that as it may, the truth is that the largely increased mining interests of the Guggenheim Exploration Co., if the present plans are carried out in detail, will drain so heavily the purse of the "seven sons" that the financial assistance of either the banking firm of J. Pierpont Morgan, or the associates of the Rockefellers in the Standard Oil Co., will be welcome. What the outcome of this "financial tea party" may be can be conjectured.

On the other hand, should the Guggenheim brothers decide to pilot their own craft across the sea of financial uncer-

tainty, the shore may be strewn with unwholesome wreckage. It is a fact that comparatively few of the Guggenheim enterprises have been offered for public subscription, which partly explains why the Guggenheim family has been so prosperous.

It would not be surprising to learn that eventually Wall street in New York or State street in Boston will be the promotion center of Guggenheim flotations. These flotations may be consolidated companies representing either copper or gold properties in which the Guggenheims have invested heavily in recent years. Should the investor at large take more kindly to these promotions after turning the wheel of fortune on Yukon gold at \$5 to \$9 per share (since then as low as \$3.50), and forget the Nipissing deal, then the Guggenheims need not worry over their treasury.

Twenty-eight volumes, each containing 26 weekly issues and reviewing the best practices in mining, metallurgy and kindred industries, is a record of merit which the subscribers and advertisers of The Mining World have testified to by their material encouragement to continue the work. With this issue we begin a new volume, confident of the friendly co-operation of our numerous readers and advertisers, and assured of the support of the foremost authorities who have contributed to our pages in the past and others whose appreciation of our efforts to publish the most authentic mining news, technical articles, market reports and statistics, has prompted them to promise to write. In the last half yearly volume, of which the elaborate index is ready for mailing to all who write for it, there appeared no less than 290 signed articles descriptive of the progress that has been made in the various branches of the mineral industry of the world. In addition to these highly prized contributions there has been published a multitude of unsigned articles, which included data of inestimable value to the practical miner, the millman, the smelterman and others. One helpful hint culled from one issue of The Mining World is worth many times the cost of one year's subscription.

Of widespread interest, especially to American manufacturers, is the announcement that in future Japan will admit all foreign mining machinery free of duty. This oriental country has made rapid strides in mining and metallurgical work since the war with Russia, and there is reason to believe that further progress

will be made. The fact that the Mikado government has in recent years sent some of its best mining engineers and metallurgists to study American and European practices, suggests that Japan is destined to become a greater power. As a producer of copper, a metal which will hereafter be exported free of duty, coal, and other minerals, Japan has already gained a reputation which is second to none in the far east. What may be accomplished in later years can be judged by the enterprise which has prompted the installation of modern methods and machinery in the mines and metallurgical plants.

Unusually severe washouts between Butte and Anaconda, as a result of the thawing of last winter's heavy snow, crippled Montana mining and railroading for several days recently. Nearly all the mines had to shut down as soon as their ore bins were filled as there was no means by which shipments could be made to the smelters. Communication by telephone and telegraph was impossible, and the mail service was also delayed. The surprising fact is that the damage by the rainstorm has been slight, excepting that to the electric light, telegraph and telephone companies, and to agriculture. Latest advices are to the effect that business generally is gradually being resumed.

It is gratifying to learn that the International Committee of Weights and Measures at Paris on June 11 voted in favor of a uniform carat for precious stones at 200 milligrams. The "metric carat," according to the bill introduced by the French government, can hereafter be given to the double decigram in transactions relating to diamonds, pearls and other precious stones. It will be illegal in France to employ "carat" to designate any other weight.

To the world at large it may seem strange that the Sultan of Turkey has recently requested a German geologist to examine and report on the mineral possibilities of the Dead Sea region. The opinion is that coal exists in quantity there, and if so, Jerusalem, which now pays nearly \$16 per ton for coal, will be supplied at low cost.

The gold output of West Africa for the first five months this year was equivalent to 119,112 fine ozs. valued at \$2,462,050. Compared with the corresponding period last year, there is shown an increase of 3,693 ozs., \$76,342, or about 3%.

# Development of Electric Mine Locomotive.

By FRANK C. PERKINS,  
Consulting Electrical Engineer.

During the past decade there have been great advances made in the development of the electric locomotive for mining service in America and elsewhere.

The accompanying illustration shows one of the early electric mine locomotives constructed in the United States. It is maintained that the first electric locomotive was built about two decades ago for the Lykens Valley colliery of the Pennsylvania railroad, and was called the "Pioneer."

Since this first electric mine locomotive was built more than 1,000 have been placed in operation in the anthracite and bituminous districts of Pennsylvania alone.

A mine locomotive was built in 1889 by the Thomson-Houston Electric Co., which three years later constructed the "terrapin back" electric mine locomotive. It shows the wonderful wearing qualities and great life of this class of electric mining machinery when it is considered that these and others of the early machines in America, as well as in Europe, are still in active service.

It is generally conceded that for reliability and convenience of operation, as well as for ease and perfection of control, the electric locomotive is superior to any other type for mining service. It is well known that these engines have large momentary overload capacity and are not liable to injury by derailment or other accidents occurring in mines, such as the falling of the roof, and there is great economy in the consumption of current and therefore reduced cost of operation as compared with other forms of power.

It is noted by the 6½-ton General Electric mine locomotive, hauling loaded cars in mine of the Rochester & Pittsburgh Coal & Iron Co., that the frames and general construction of electric mine locomotives are of such shape and design as to fully protect the electrical apparatus from injury, each frame consisting of two heavy side castings and two end pieces, held together by heavy bolts, the whole structure having the rigidity of a solid casting. The 6½-ton General Electric locomotive is of great strength and capacity, and is provided with two independent sets of driving wheels, upon the axle of which is mounted an enclosed steel-clad motor of the General Electric type. The motors have field frames of cast steel, which entirely enclose the motors, making them water-proof and dust-proof.

For driving the axles, the motors are provided with single reduction gearing enclosed in a malleable iron dust-proof case partially filled with oil. These electric motors are arranged in tandem, one motor being placed between the axles and the other turned outward at the end of the locomotive opposite the operator. For the largest locomotives of 13 tons and over, the motors are centrally located and turned towards each other between the axles.

Electric locomotives have been in use for some time at the mines of the Moon Run Coal Co. at Moon Run, Pa., as well

*Over 1,000 electric locomotives in Pennsylvania collieries. Advantages of and improvements in construction of various types of mine locomotives.*

*Capacity, speed, and electrical consumption of modern mine locomotives. Haulage systems compared. Method of calculating haulage power, and laying mine tracks. American locomotive in Japanese copper mine.*

as at Ehrenfeld, Pa., at the pit of the Webster Coal & Coke Co.; also at the mines of the Rochester & Pittsburgh Coal & Iron Co.

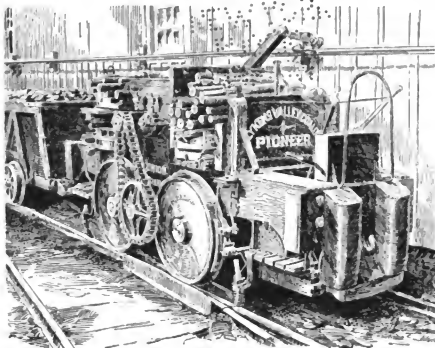
The 6½-ton General Electric mine locomotive has a draw-bar pull of 2,500 lbs., and operates at a speed of 7.4 miles per

miles per hour. The 10-ton locomotives have a draw-bar pull of 3,500 lbs., with an approximate input of 75 kw.; while the 20-ton engine takes 160 kw. and has a draw-bar pull of 7,500 lbs.

Electric mine locomotives are not only utilized for hauling coal and ore, but are also employed for hauling wood and other material, as at the Australian mines of the Mount Morgan Gold Mining Co. and at the mines at Kellogg, Idaho of the Bunker Hill & Sullivan Mining & Concentrating Co.

One of the most successful of modern electric mine locomotives is shown in the accompanying illustration hauling a loaded train of cars for the Wright Coal & Coke Co. in West Virginia. The Goodman Electric rack haulage system has been adopted at this mine. The original Goodman electric rack locomotive installed at the Wright mine was equipped with two 80-h. p. motors, geared to the insulated sprockets mounted upon the axle and meshing into the rack rail.

It is stated that for three years this locomotive did the entire haulage work,



First American Electric Mine Locomotive.

hour. The approximate electrical energy used is 50 kw. This locomotive has outside wheels and operates on a track having a gauge of 34 ins. The total length over all is 133½ ins., and the height of the frame above the rail is 34 ins. Locomotives of this capacity with inside wheels have a length of 143 ins. over all, and are designed for a minimum gauge of 24 ins., the wheels having a diameter of 28 ins., and the wheel base measuring 44 ins.; while the minimum radius of curve is 22 ft.

The 10-ton mine locomotives of the General Electric type, as well as the 20-ton engines, operate at a speed of eight

serving the three drifts and hauling trips of 16 cars. The work became too heavy for the one electric locomotive as mine developments progressed, on account of the distance of the drift from the power house, so the new locomotive was installed.

This modern Goodman electric rack locomotive has a single motor of 100 h. p. capacity. The adverse grades are all inside the mine, varying up to the extreme of about 14% for short distances in certain places. There are some level stretches, but the greater part of the haulage inside is on adverse grades of from 5 to 10%. Outside of the mine the

haulage gives a gentle down-grade continually from the No. 4 drift to the drum house. For heavy grades in mining service the electrically operated rack locomotives of the Goodman type solve the difficulty in work of this severe character.

An adhesion electric mine locomotive of the Goodman type is shown in another illustration. This locomotive is starting with empty cars on the first trip of the day at Eskdale, W. Va., at the mines of the Holley & Stephenson Coal & Coke Co., in the Cabin Creek district of the Kanawha field. This mine locomotive has a capacity of  $7\frac{1}{2}$  tons, and is of the single motor type, capable of handling upwards of 30 cars. The haulage at this mine is not difficult, as the coal seam is somewhat rolling in character, the main roads giving gentle grades in favor of the loads so that mule haulage is feasible inside the mine under present conditions.

The electric locomotive hauls the cars, which weigh 1,700 lbs. each and carry two tons of coal from a point 300 ft. inside

vise, is in use at the mine of the Pittsburgh Coal Co. This type was designed to meet the demand for a gathering locomotive and has a vertical reel of large diameter carrying about 600 ft. of flexible insulated cable.

The end of the cable is connected to the trolley circuit, and the current is conducted to the controller through a contact at the center of the reel. A sprocket chain is employed for driving the reel from the rear axle of the locomotive bevel gearing, being used also with small pinions on an intermediate shaft and a large horizontal gear.

The reel proper is not rigidly attached to the horizontal gear, but is driven therefrom by the friction due to its weight. The horizontal intermediate shaft, driven from the main axle by the sprocket chain, is in motion whenever the locomotive is running. The two bevel gears are stationary, except when the reel is in service.

Heretofore instead of gathering the

output of the mine, with the same amount of development. In many veins it is necessary to increase the height along all the haulage roads, in order to accommodate the smallest animals obtainable. The cost of "brushing" the roof, or taking up the "bottom," is a formidable expenditure, which in many cases would be eliminated by the adoption of electric mine locomotives.

From the above remarks it is evident that an efficient gathering locomotive would meet a very important requirement in mine operation. It is well known that for service of this nature the compressed air gathering locomotive has been used to some extent.

The electric gathering locomotive with its cable reel device is of great service. At mine room entrances the trolley pole is fastened down, the end of the cable is hooked over the trolley wire and one of the clutches is thrown in by moving the lever to one side from the central off position. As the locomotive travels the face of the room, the cable unwinds from the reel and the friction surface produces a tension on the cable of about 30 lbs., which effectually prevents "kinking." The instant the locomotive starts in the opposite direction toward the heading, the pinion is positively driven from the intermediate shaft by means of the automatic clutch. Motion is transmitted to the reel through the long horizontal gear, and the process of rewinding the cable begins.

When the locomotive is reversed in the room no manipulation is required of the lever, which was set before leaving the heading; thus it can readily be seen that the reel is absolutely automatic in its operation.

The operations of reeling and unreeling the cable are independent of the direction in which the locomotive is moving, and the cable may be led from either end of the locomotive. A tension of approximately 30 lbs. is maintained on the cable while unreeling, and the essential feature of this device is the method by which the same result is accomplished while reeling on the cable. If the reel were positively driven it would not wind the cable on with sufficient rapidity at first and the locomotive would be liable to run over and cut the cable. Furthermore, as the diameter of the reel increases, due to the layer of cable, the speed of reeling would become too high and the cable would be broken.

As already stated, the connection between the reel proper and driving gear is due entirely to the friction between large annular surfaces. The ratio of the driving gearing is such that, except for the friction surfaces, the peripheral speed of the reel would be about 25% higher than the linear speed of the locomotive.

It is obvious, therefore, that when the cable is being wound on the reel there is always a slipping between the friction surfaces, with the result that the tension of about 30 lbs. is maintained on the cable at all times. This is the essential feature of the mechanism, since it is practically impossible to run over or break the cable and there is always sufficient tension to prevent "kinking."

Of hardly secondary importance are the automatic clutches, by means of which no



General Electric Locomotive in Ashio Copper Mine, Japan.

the mine opening. From this parting outside there is nearly a mile to haul around the mountain to the tipple, and the trips of 16 to 20 cars are handled by the  $7\frac{1}{2}$ -ton Goodman single motor mine locomotive.

The track gage is 44 ins. and 25-lb. rails are laid on the outside roadway and inside the mine to and including the motor parting, while for the mule haulage and room tracks 16-lb. steel rails are employed.

Electric mine locomotives having wheels within the frames are used at Weston, Mass., by the Columbus Construction Co. In America, as well as in Japan, the single pole under-running trolley wheel is largely used, the trolley wires being fastened to the roof of the mine by strong insulators and at curves to the side walls of the galleries. A number of small General Electric locomotives are used at the Ashio copper mine in Japan, one of which is illustrated herewith.

At Iselin, Pa., a unique type of electric mine locomotive with a cable reel de-

coal by electric locomotive with cable reels, other methods were employed. While electric mine locomotives are extensively used for haulage in coal mines, the cars are still largely "gathered" from the working faces of the rooms by mules or horses.

In a few low vein mines where very small cars are necessary, the miners push the cars between the working faces and the "room necks," from which points they are collected by locomotives and hauled in trains to the tipple or shaft bottom. This practice is limited and is confined to practically level rooms. Mine haulage with mules or horses is expensive and extremely unsatisfactory, especially where large cars are used, or where the rooms are driven on even moderate grades. It would be decidedly advantageous in many mines to employ larger and fewer cars, or to have heavier grades in the rooms, provided a suitable substitute for the mule were available.

The use of larger cars, handled expeditiously, would materially increase the



manual adjustment of the cable lever is necessary while the locomotive is operating in a room.

The reel proper completely covers operating mechanism and affords protection from dust and dirt, and the top of the reel may be removed by one man for inspection and repairs. A 2-way switch is located conveniently near the controller, by means of which the cable is entirely disconnected from the circuit when the locomotive is operating from the trolley wire, and vice versa when the cable is in use the trolley pole is "dead."

Electric mine locomotives weighing  $4\frac{1}{2}$  to  $6\frac{1}{2}$  tons are most suitable for this work, as a lighter engine would not haul sufficiently large trips on the headings, while a larger locomotive would be too heavy for the light rails in the rooms.

It is claimed that one of the more surprising features of the operation of the cable reel is the durability of the cable itself. A rapid abrasion of the insulation might be expected; but such wear does not occur, for the reason that the cable

Railroad Co. has a  $6\frac{1}{2}$ -ton locomotive which easily has served 24 chambers, gathering 130 loaded cars and placing 130 empty cars per shift. At last accounts this locomotive was also working nights handling the same number of cars and displacing 13 mules with their drivers on each shift. In the bituminous field, the haulage conditions are in general less exacting, and in a typical soft coal mine with modern grades experience has shown that a  $4\frac{1}{2}$ -ton electric gathering locomotive may be expected to displace five to seven mules.

In one case a  $6\frac{1}{2}$ -ton gathering locomotive has displaced six horses which had cost about 75 cents per day for keep, including feed, harness, stable hire, etc., and each horse cost \$190 to \$200, four boys at \$1.00 a day, one man at \$2.30 per day and another at \$1.75 per day. The locomotive effects a saving of \$5 per day

nary circumstances on level track in good condition. It is customary to rate the draw-bar pull of the locomotive at from one-eighth to one-quarter of the weight on the drivers, the exact coefficient ranging with the weight of the locomotive and also with different manufacturers.

The maximum starting effort is determined by the slipping point of the wheels, and is, with sand, not far from 25% of the weight on the drivers. The capacity of the locomotive is, therefore, determined by its weight, and locomotives of the same weight should haul the same loads under the same conditions, regardless of any difference of the draw-bar pull rating adopted by the manufacturer.

The best mining engineers hold that the motors with which the locomotive is equipped should be of sufficient capacity to take advantage of the full adhesion of the



Electric Locomotive Hauling Wood.



Goodman Adhesion Electric Mine Locomotive.

is carefully laid on the floor, under moderate tension, and as carefully picked up and rewound on the reel. In actual practice, a flexible and well insulated cable may be expected to endure a year of regular service before renewal is necessary.

The practicability and success of the gathering locomotives may be expressed in terms of displaced mules. It may seem somewhat paradoxical, but the gathering locomotive makes the most favorable showing under the most severe conditions. In other words, where heavy cars are used and severe grades prevail, the economy of the electric gathering locomotive is more pronounced than in a mine employing lighter cars on comparatively level roads. Small cars, however, are generally employed in working a low vein; and here again the electric locomotive has an important advantage, since it is unnecessary to "brush" the roof or take up the floor to provide head room for mules.

In the anthracite district, where the haulage conditions are more severe than in an ordinary bituminous mine, electric gathering locomotives are regularly doing the work of 10 to 15 mules, and a  $4\frac{1}{2}$ -ton locomotive of this type has hauled loaded cars out of a dipping chamber where the grades was so steep that four mules in tandem were required to haul out one car.

The Cayuga mine of the Lackawanna

after loading, with an item of \$2 per day for wear and tear, including depreciation of the locomotive and cable and the wear and tear of trolley lines and track.

It is reported that this locomotive is gathering about 85 cars per day on the average. The cars are placed at and taken from the face of the coal, and more cars could be gathered if the mine were laid out for this class of work.

There is a certain similarity in the general design of the electric locomotive built by the principal manufacturers, the locomotive consisting essentially of a cast iron truck of such shape as to protect the electrical apparatus with either outside frame or inside wheels. These motors, with the exception of the smaller size locomotives, are spring suspended from the outside frames and drive the axle through the steel gearing, and all locomotives have magnetic blowout controllers.

Generally, the rated draw-bar pull and speed of the locomotives constructed by the principal manufacturers like the General Electric, Goodman, Jeffrey, Baldwin, Morgan-Gardiner, and Westinghouse, represent their normal capacity under ordi-

Locomotives and the motors used. Electric locomotives should be especially designed for mining service. Railway motors are usually rated on the horsepower load they will carry for one hour, with a temperature rise not exceeding 75 degs. C, but an arbitrary horsepower rating of the motors is of small interest, as these conditions do not even approximate those under which the mine locomotive will operate. Of greater importance than offering a larger horsepower rating on the motor is the mechanical properties of the motor.

While the rated draw-bar pull and speed of the locomotive should be used as a basis for calculating the mine haulage, at the same time the general character of the service should be considered. If the haul is of great length, the average draw-bar pull required should be well within the rated draw-bar pull of the locomotive, while if the haul is short and the service intermittent (the usual condition), the locomotive may be operated at its rated draw-bar pull.

The hauling power of a locomotive on a level track depends upon the track resistance, which, whenever possible, should



be accurately determined. An accurate method of determining the track resistance is to ascertain the minimum grade on which the cars will run at a uniform speed, after being put in motion. The track resistance per ton is the product of the percentage of the grade of 20. For instance, if the cars will "coast" without acceleration on a  $1\frac{1}{2}\%$  grade, the track resistance is 30 lbs. per ton.

The track resistance is a very variable quantity, and in this class of work is generally much greater than in regular railway service. With the best of self-oiling car wheels and well laid heavy rails, the track resistance may not exceed 15 lbs. per ton. Generally, the figure is more nearly 30 lbs., and in the absence of definite data, this value may be safely used in calculations. If the car wheels are loose on the axles, allowing them to rub against the sides of the car, and if the

an accurate profile of the track should be consulted. Grades are usually expressed by the ratio of the rise in a certain length of track, to its length; that is, a section of track 100 ft. long with a uniform rise of 3 ft., would continue a  $3\%$  grade.

It is essential that a proper method of determining a grade be employed by using surveyor's instruments; but where the grade varies many times in a few hundred feet it is more important to know the maximum than the average grade.

In such cases it is sufficiently accurate to use a straight edge, 100 in. in length, and placing one end on the rail and leveling it with an ordinary spirit level, to measure the vertical distance in inches from the bottom of the other end of the straight edge to the top of the rail. This gives the grade in per cent approximately, the error being on the safe side. For strict accuracy, the vertical distance

radius; that is, the distance from the center line between the rails to the center of the circle of which it forms an arc. Civil engineers sometimes designate a curve by degrees, specifying the number of degrees of central angle subtended by a chord of 100 ft., but the sharper curves which are found in this class of work are usually designated by their radii.

It is evident that the additional track resistance due to a curve is very considerable and extremely variable, and is, of course, greater the shorter the radius. On the sharp curves usually found in mines it is safe to say that the track resistance is doubled and often increased in greater ratio. The momentum of the train very materially assists in passing around short curves. A great deal also depends upon the wheel base of both the locomotive and the cars, and for sharp curves it should be as short as possible.

The resistance due to track curvature may be materially reduced by widening the gage of the track at the curve. On very sharp curves the gage should be increased as much as the width of the wheel tread will permit. It is desirable to elevate the outer rail of a curved track in



Unique Electric Mine Locomotive. Trolley Wire on a Curve.

rails are too light and not kept in good repair, the track resistance will sometimes be as high as 80 or 100 lbs. per ton.

The more prominent mining engineers maintain that the use of self-oiling car wheels should be encouraged as much as possible, and also the adoption of heavier rails. For animal or rope haulage, the prevailing light rails are satisfactory, but for locomotive traction haulage the rails should be much heavier; in fact, the heavier the better. It is customary to provide 100 lbs. per yd. of rail for each ton supported by one locomotive driver. In accordance with this formula, a 10-ton, 4-wheel locomotive would require rails weighing 25 lbs. per yd. This figure should be considered a minimum, and the additional cost of a heavier rail, say 45 lbs. per yd. for a 10-ton locomotive, would be an excellent investment.

In providing for electric mine locomotive service all the grades should be carefully considered and, whenever possible,

should be divided by the length of the track vertically beneath the straight edge. Grades are sometimes expressed in degrees, or the amount of angle which the incline forms with the level. Such an expression may be transformed to per cent by simply multiplying the sine of the angle by 100.

The resistance due to the grade, which is additional to the track resistance, is always 20 lbs. per ton for each per cent of grade or for each foot rise in 100 ft. For instance, the total resistance on a  $3\%$  grade, assuming the track resistance to be 30 lbs. per ton, would be 90 lbs. per ton. The rated draw-bar pull of the locomotive applies to a level track, and allowance is made for the energy required to overcome the track resistance. In other words, the draw-bar pull is the tractive effort exerted by the motors, minus the effort necessary to propel the locomotive itself.

It must be remembered that the simplest method of designating a curve is by its



Goodman 120-H. P. Electric Locomotive.

order to counteract the tendency of centrifugal force to overturn the cars or crowd the wheels against the outer rail too hard, with possible derailment. As the amount of the elevation depends upon the speed and other conditions, as well as upon the radius of the curve, no definite rule can be given.

The time schedule is as important a feature of a mine haulage system as of a street railway and has a vital bearing upon the size of the generator and engine. With two locomotives it is obvious that a smaller generator would be required if while one is hauling a loaded trip, the other is going in with a trip of empties, than if both are hauling loaded trips at the same time.

Where several locomotives are operating simultaneously from the same generator with the schedule arranged to the best advantage, the load factor is from 30 to 70% of the aggregate full load kilowatt capacity of all the locomotives, assuming the line loss to be not more than 15%.

The generator and locomotive both possess large overload capacities, but it is well to be liberal in generator capacity, in order to provide for future extensions of the haulage system and other uses of the current which are sure to follow, such as driving coal cutters, drills, pumps and hoists.

# The Iron Range Meeting of the L. S. M. Institute.

## EDITORIAL CORRESPONDENCE.

The thirteenth annual meeting of the Lake Superior Mining Institute, held in the Lake Superior iron country, June 24-27, 1908, was, without doubt, one of the most interesting and instructive in the history of the society. In no other section of the great iron regions could a better opportunity have been afforded for a close inspection of iron mining methods than that offered in the immense open pit propositions on the Mesabi range.

Though it is generally known that the past six years have witnessed remarkable advancement in this section, yet the immensity of the stride made is startling to those who visited the ranges at the last iron country meeting of the institute, in 1902.

Some idea of the magnitude of the industry may be gained by the production of the Mesabi range, which in 1907 was 27,492,949 long tons. To produce this great tonnage of ore necessitated the expenditure of many millions of dollars for huge steam shovels, mining and loading

*Visits to prominent iron mines on the Mesabi and Vermilion ranges. Improvements in mining during past six years. Mammoth operations at Coleraine. Geology of ore deposits.*

*Committees in charge of meeting. Papers read by members. Election of officers for ensuing year.*

machinery, huge ore docks, railroads, immense lake steamers, etc.

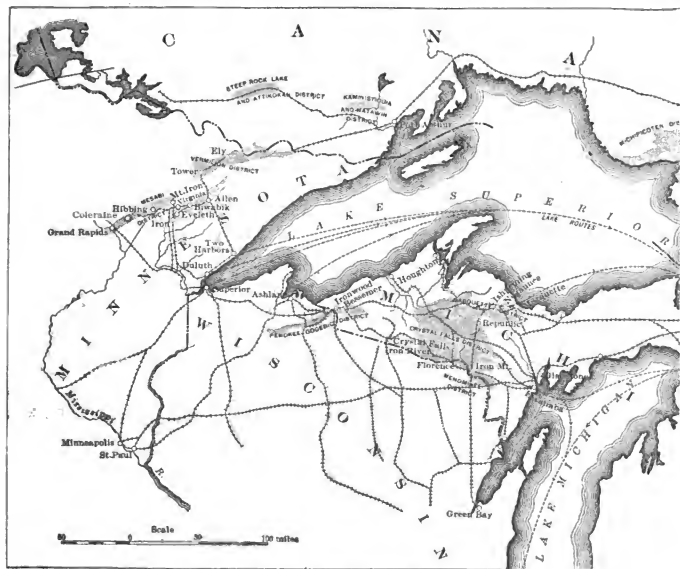
### THE IRON RANGES OF MINNESOTA.

There are two distinct producing iron ranges in Minnesota—the Vermilion and Mesabi. In trend they are approximately parallel (east, northeast and west, southwest) and about 13 miles apart. On the west, both ranges disappear beneath heavy drift, and on the east extend into Canada, the so-called Gunflint range near the international boundary being an east-

ward continuation of the Mesabi formation. This latter range is of no economic importance, however, at present. The recently discovered Cuyuna range has as yet no producing mines.

In 1875 Prof. A. H. Chester examined the Mesabi range from Embarras lake eastward to Birch lake. In the greater portion of the district examined by Prof. Chester the formation is highly magnetic and has never produced bodies of merchantable ore. Shortly afterwards attention was almost wholly diverted from the Mesabi by the discovery of iron ore on the Vermilion range.

In the early '80s, George C. Stone, having succeeded in interesting Charly-nange Tower in the ore deposits on the Vermilion range near Tower, docks were built at Two Harbors and the Duluth & Iron Range railroad extended to Tower. The first shipment of ore was made in 1884. In 1886 the whole property, including mines, railroad, docks and land grant, was sold to the Minnesota Iron Co., and later on became a part of the holdings



Map of the Lake Superior Iron Region.



Mining Iron Ore with Steam Shovel at Stevenson Mine at Hibbing.



Working with Steam Shovel at One End of Fayal Mine at Eveleth.

of the United States Steel Corporation. The first mine to be developed near Ely, 21 miles east of Tower, was the Chandler, which began shipping in the fall of 1887. Since then the Pioneer, Zenith, Saxoy and Sibley have been opened in what is known as the Ely trough.

On the Mesabi range ore was discovered in the fall of 1890 near the present Mountain Iron mine by the Messrs. Merritt of Duluth, and in the fall of the following year on the Biwabik property by the same parties. Since these discoveries the development of the Mesabi range has been phenomenal. By the end of 1893 three railways—the Duluth & Iron Range, Duluth, Mesabi & North-

extent—at Tower and at Ely. The iron-bearing formation of this range occupies the lowest position geologically of any of the Lake Superior iron formations, being placed by Van Hise and Clements in the Archaen.

The ores of the Vermilion series occur in the Soudan formation. At the Minnesota mine the ore is a dense, hard hematite occurring in irregularly connected and disconnected lense-shaped bodies, in jasper, which is intricately embedded in the spheroidal greenstone or green schists. The strike is about east and west, and the dip approximately vertical, with a westerly pitch.

The ores at Ely differ from the Min-

nesota range are: At Ely, the caving system, and at Tower, longitudinal back stoping.

#### MESABI RANGE.

The Mesabi range extends continuously from near Grand Rapids on the Mississippi river east northeast for a distance of about 90 miles to near Birch lake, where it is covered by the large gabbro flow which forms the base of the Keweenaw series. The same formation (Mesabi) appears again near Gunflint lake on the international boundary and shows as far east as Thunder bay on the north shore of Lake Superior.

Between Mesabi station, on the Duluth & Iron Range railway, and Birch lake, the



An 85-Ton Bucyrus Steam Shovel at Biwabik Mine.

ern and Eastern railway of Minnesota (Great Northern system)—connected the mines with ore docks at Two Harbors, Duluth and Superior.

In 1907, 90 mines on the Mesabi range sent forward 27,492,949 tons of ore, as against 12,890,708 tons shipped from 83 mines on the Gogebic, Marquette and Menominee ranges.

#### VERMILION RANGE.

The Vermilion range extends from the vicinity of Tower to and beyond the international boundary, crossing into Canada at the eastern end of Hunter's island. Merchantable bodies of ore have been discovered at but two localities along this

nesota mine mainly in their physical structure, being much more broken and friable. The area in which they lie is a double ended trough, about two miles in length east and west, and some 1,500 ft. in width. The general dip is nearly vertical, and the pitch of the ore bodies at the west end of the trough is to the east, while the pitch of those at the east end is to the west. The iron formation here, as at the Minnesota mine, lies in a trough of the older spheroidal greenstone, but the folding is not so close. Intrusive masses and dikes of gigantic porphyry and basic eruptives cut the whole series.

The mining methods employed on the

formation consists of alternate thin layers of chert and magnetite, but although considerable exploration work has been done, there is no evidence of concentration of ore in workable bodies in this area. All the workable deposits at present known on the Mesabi lie between Mesabi station and Grand Rapids, the greater number being in St. Louis county.

The north edge of the range was easily determined, as exposures of the older rocks are fairly numerous; the south edge, or more properly the north edge of the overlying black slates, was determined by drilling entirely, as there are no exposures of the slates.

The iron formation is flat-lying with

a slight average dip to the south, although local high dips occur. In this respect it differs from all other districts in the Lake Superior region. The great bulk of the iron formation is ferruginous chert, more or less amphibolitic, calcareous or sideritic and gray, red, yellow, brown, or green with bands or shoots of iron ore. It is analogous to the jaspers of the other iron ranges. A few thin beds of slate occur in the formation.

It may be said that the ore bodies in general lie with their longer axes in the direction of the trend of the formation, although they are exceedingly irregular in outline. The transition between the rich ore and the taconite is usually very abrupt, and the original bedding can be plainly distinguished running through the ore. One body of ore is known to have a continuous extension of over two and

a half miles, a condition evidently resulting from the decomposition of the cherty layers in the banded iron and chert.

On the Mesabi range the mining methods in use are the open-pit steam shovel, open-pit milling, open-pit milling steam shovel, slicing, square set, and slicing caving combined.

#### COMMITTEES OF THE INSTITUTE.

The arrangements for the comfort and entertainment of the 250 members and guests who attended the Institute meeting were admirable and were successfully carried out by the following committees:

Arrangements—Wm. J. Olcott, chairman; Wm. C. Agnew, Charles Trezona, Pentecost Mitchell, Joseph Sellwood, C. T. Fairbairn, W. W. Walker, Dwight E. Woodbridge.

Transportation—W. A. McGonigle,

ing and street railways of both cities, for pumping the Duluth water supply, for operating the unloading and conveying machinery of coal docks and grain elevators, for electrolytic processes, and for driving the motors of various other industries. The installation will be increased ultimately to 80,000 hp., and storage reservoirs will be constructed of sufficient capacity to make an ample water supply continuously available. To insure reliability, continuity and economy of power service, the equipment and construction has been made typical of the highest state of the art.

The Zenith Furnace Co. has a daily capacity of 225 tons of pig iron. The slag is granulated and sluiced to fill dock space. There is a by-product coke oven plant of 50 Otto-Hoffman ovens, with the following daily capacity: Coal coked, 350 tons; coke produced, 250 tons; tar, 400 gals.; concentrated ammonia, 10,000 lbs. (20% ammonia gas), and illuminating gas, 1,250,000 cu. ft.

The immense ore docks of the Duluth, Missabe & Northern railroad were also visited, as was the aerial bridge, the only structure of its kind in the United States.

In the evening an informal smoker was given at the Northland Country Club, which proved a very enjoyable affair.

#### THURSDAY, JUNE 25.

Two special trains were made up, the first of nine Pullmans, two diners and an observation car; the second of 10 private cars, and at 1 a. m. the start was made for the iron ranges. The first stop was at Ely, on the Vermilion range, where several hours were spent in a general inspection of the Chandler, Pioneer, Zenith, Savoy and Sibley mines. These properties are operated by the Oliver Iron Mining Co. and last year produced 1,582,280 tons of ore. The underground haulage system of the Pioneer, the various steel shafts and shaft houses, and the hoisting plants proved of much interest to the visitors. Since 1888 the Ely trough has produced ore to the extent of 18,631,606 tons.

A brief stop was made at Soudan, permitting the inspection of the Minnesota mine, which is also operated by the Oliver Co. It was this property, which last year produced 102,927 tons, that led to the building of the Duluth & Iron Range railroad.

Biwabik, the first point visited on the Mesabi range, is credited with the introduction of the first steam shovel used for stripping. The Biwabik mine was the scene of this operation, and it occurred in 1892. This is an open-pit property operated by the Biwabik Mining Co., and has produced 8,212,267 tons of ore to date. The Kellogg mine, a new underground property, is being operated by the Oliver Co., and has an extensive deposit. Adjoining it on the east is the new Monica mine of the Republic Iron & Steel Co.

At Eveleth is located the Oliver Co.'s Fayal mine, an open-pit property, which produced 1,878,000 tons last season, and the big Adams-Spruce of the same company, which shipped 1,746,970 tons. Both steam shovel and underground mining is in progress on the latter property. This



View of Part of Mahoning Pit at Hibbing.

one-half miles and an average width of about one-half mile and to be several hundred feet thick in places.

These flat-lying ore bodies vary in thickness from a few feet to over 500 ft., and a large majority occur just beneath the drift, although some have a jasper capping. The surface or overburden varies from practically nothing to some 200 ft.

The ores of the Mesabi are red, brown and yellow hematite and limonites, more or less hydrated, and are secondary replacements or enrichments of the jasper. They are supposed to be mainly derived from the silicates of iron, which are abundant in the rocks of the iron formation, and to a less degree from siderite. In physical structure they vary from a fairly compact phase to earthy or powdery phases, and are comparatively high in moisture. At the west end of the range the ores are more or less san-

chairman; F. E. House, Thomas Owens, D. M. Philbin, J. W. Kreiter.

Entertainment—John H. McLean, chairman; J. S. Lutes, G. G. Hartley, Chas. A. Duncan, Wm. J. West.

#### AT DULUTH.

A majority of the members and guests arrived at Duluth early Wednesday morning and the day was spent very profitably in visiting the various points of interest in this remarkably progressive city.

Of main interest to the majority was the big undertaking of the Great Northern Power Co., at Fond du Lac, about 20 miles from Duluth. This company is now delivering electric power from its hydro-electric station on the St. Louis river to various industries and public utilities in Duluth and Superior. The present installation consists of three 10,000-hp. generating units operating under a 375-ft. fall, and furnishes power for the light-



portion of the Mesabi was developed for its first shipments in 1895.

The special trains arrived at Virginia at 7:15 p. m., and at 8:15 p. m. the first session of the Institute was held and was called to order in the High School hall by President Thos. F. Cole. Louis F. Osborn of Virginia delivered the address of welcome, and a response was made by W. J. Olcott, general manager of the Oliver Iron Mining Co.

In his address President Cole said:

Members of the Lake Superior Mining Institute: I am sure that all the people living on the iron ranges of Minnesota join with me in extending to you a hearty welcome to this, the thirteenth annual meeting, of the Institute and it gives me much pleasure to greet you tonight. I assure you that your return will be looked forward to by the people of these ranges with a great deal of gratification.

I would like to call attention to a few facts regarding the work of the past two years in the Lake Superior mining districts. I will not attempt to go into details, for papers on some of the subjects have either been prepared or will be written and read at some future meeting.

The use of steel for mine buildings and head frames for shafts is increasing. In addition a considerable quantity of this metal is now used for frames to support the walls of shafts. Whenever it is possible to locate shafts in stable rocks affording a permanent and fairly secure outlet steel or concrete lining should be used. Danger from fire is lessened and the cubic feet of rock to be broken and hoisted is reduced by using steel frames instead of timber.

The Oliver Iron Mining Co. is now planning to use steel frames to support the walls of the main openings such as drifts and crosscuts on each level instead of using large timber for such support. We expect to save money in protecting our drifts and crosscuts with this material, for the large timber we will secure from our lands will then be cut into merchantable lumber, and good value can be secured for this product.

The people of the country will be benefited for high grade lumber from that part of the tree free from knots and other defects in each year becoming more difficult to secure in regulate quantities.

The first ore dock to be constructed of steel and concrete is now being erected at Two Harbors, Minn.

Notable installation of structures, buildings and equipment to utilize the energy of water powers in the Lake Superior region have been made during the past two years, one at the Sturgeon falls near Nuluan, Mich., by the Penn Iron Mining Co., the other at falls on the St. Louis river near the city of Duluth.

Conservation of natural resources should mean the development and utilization of energy that all our water powers will produce.

The saving to the people of this nation is well illustrated by the fact that with ordinary waste in numerous steam power plants necessary to secure the producing industries located near the head of the lakes the full utilization of this one water power near Duluth with equal results could be secured from the output of a mine producing 1,500,000 tons of good steam coal per annum.

State government should construct reservoirs of ample capacity to store flood waters and ensure a constant supply of water in its rivers each day of the year, making a reasonable charge to individuals or power companies who may be benefited thereby.

United effort should be made by all members of this Institute to secure careful consideration by state officials and members of state legislatures of the important subject of conservation of our forests, and advocate the enactment of laws that will be just and that will benefit individuals or corporations who may desire to foster the growth of young, thrifty timber and reforest areas of land that are of value for agricultural purposes, the soil of which is suitable for reforestation. Much land of this character is now being converted by valueless and taxes are not being paid thereon.

The decision of the United States Steel Corporation to erect blast furnaces and steel works to manufacture steel in Duluth is of tremendous importance to the people living in Minnesota, as well as in the entire northwest.

The raw materials to make iron can be assembled in Duluth at reasonable cost,

and the volume of finished steel that should be distributed from Duluth is already a very important tonnage and is increasing in quantity very rapidly each year. From that city steel can be distributed to points covering two-thirds of the area of the Dominion of Canada. The states comprising the northwest are tributary to the head of the lakes and the iron range from Duluth to Omaha, Denver, Salt Lake City and San Francisco is the same as from Chicago. This means steel can be made in Minnesota and distributed in the middle Rocky Mountain states and the entire Pacific coast.

During 1906 and '07 extensive development of the sandy ore deposits located in the western Mesabi district has been made. Openings in the ore disclosed the character of material to be concentrated. It was found the ore and sand would have to be subjected to a very effective abrading treatment before the mineral could be successfully concentrated. A committee was selected to visit the iron ore concentrating plants in the south, and John F. Sebenius of our engineering department with General Superintendent John T. Greenway, J. W. Leech and Superintendent Busley composed this committee. It was found the log washers used for concentrating the brown ores in Alabama would give the abrading effect required. It was decided to erect a temporary concentrating plant and install a log washer with other equipment, such as revolving screens and pick-

ing belt. The log washer not only is effective in giving the necessary treatment but it is a good concentrator, and the improved type of log washer of turbo type invented by Mr. Greenway may be selected for the final treatment of material derived by the log washer or caught from the overflow in settling tanks instead of revolving screens.

A nominating committee was chosen as follows: F. E. Keese of the Marquette range, M. W. Haire of Houghton, Mich.; C. H. Munger of Duluth, W. J. Richards of the Menominee range, and D. E. Sutherland of the Gogebie range.

FRIDAY, JUNE 26.

A portion of the morning was spent in looking over the Virginia mines. Here is located the Lone Jack, Ohio, Oliver and Norman, operated by the Oliver Co. The Oliver is a state lease returning 25 cents a ton to the public schools of the state. It is being extensively developed, and 2,550,000 yds. of overburden has been removed. Among other properties is the Minorca of Pickands, Mather & Co., which produced 154,660 tons last year; the Larkin of the New York State Steel Co., with 22,019 tons; the Commodore of Corrigan, McKinney & Co., with 477,293 tons; the



Steel Shaft of Pioneer B. Mine at Ely.

ing belt. The log washer not only is effective in giving the necessary treatment but it is a good concentrator, and the improved type of log washer of turbo type invented by Mr. Greenway may be selected for the final treatment of material derived by the log washer or caught from the overflow in settling tanks instead of revolving screens.

Valuable assistance was rendered by Dr. L. D. Ricketts of Cananea, Mex., and William Nicholas, now in charge of the concentrating plants of the Nevada Copper, Copper Co. and Cumberland Ely Copper Co., operating in Nevada. Much credit is due the persons mentioned and their assistants for the successful outcome of the experimental work, and a concentrating plant with large capacity will be erected near Coleraine in the near future.

The following papers were presented: "Sampling of Iron Ores," Prof. L. S. Austin of Houghton, Mich.; "Automatic Throttle Device for Hoisting Machinery," Spencer S. Rumsey of Duluth; "Structures of Mesabi Ore," M. N. Winchell, Minneapolis.

An auditing committee was appointed, consisting of the following: J. M. Bush of the Gogebie range, Charles T. Kruse

Franklin and Onondago of the Republic Iron & Steel Co., with a combined output of 31,417 tons, and the Lincoln of the Jones & Laughlin Steel Co., with 267,870 tons, one of the best of the Mesabi underground productions.

Arriving at Mountain Iron at 10:45 a. m. an hour was spent in inspecting the Mountain Iron mine, a giant open-pit property which has shipped more than any single property on the globe, its production since first opened in 1892 being approximately 17,000,000 tons. This was the first property to be taken over by the Carnegie-Oliver coalition of some years ago, and thus, with the Oliver mine, formed the basis of the Oliver Iron Mining Co. In order to reach the ore body of the Mountain Iron mine stripping to the extent of 4,825,000 yds. has been necessary.

The Monroe-Tenner mines have been opened on a large scale and are excellent examples of stripping and milling propo-

sitions. In the past three years a total of 3,875,000 yds. of earth has been removed.

It was here that a reception committee of 100 of the leading citizens of Hibbing met the visitors and transferred them to a special train of flat cars, which had been fitted up with seats, etc. From this train a splendid view of a number of the open-pit mines of the Hibbing section was obtained.

The Hull-Rust, generally credited with having the largest deposit in the world, produced last year 2,900,493 tons; the Mahoning, alongside the Hull-Rust, another great open-pit property, 1,564,332 tons; the Burt, 1,501,000 tons; Morris, 2,000,000 tons; Stevenson, 1,142,977 tons, and a dozen others with a production ranging from 20,000 to 500,000 tons.

From the Burt and Hull-Rust 8,400,000 yds. of surface has been removed, and

"Mine Waters" was the subject of a paper presented by Arthur C. Lane, state geologist of Michigan. A paper on "Acetylene Gas as an Underground Light" was read by W. S. Slaughter. The question of mine sanitation was briefly discussed.

The following officers were elected: President, M. M. Duncan of Ishpeming, Mich.; vice-presidents, W. J. Richards of Crystal Falls, Mich., and Charles Trezona of Ely, Minn.; managers, T. E. Keese of Ishpeming, W. J. Uren of Calumet and L. M. Hardenburg of Hurley, Wis.; treasurer, E. W. Hopkins of Commonwealth, Wis.; secretary, A. J. Yungbluth of Ishpeming. Both Messrs. Hopkins and Yungbluth were re-elected.

The citizens of Hibbing gave the visitors a cordial reception and had prepared various forms of entertainment for them. The parlors of the Algonquin club were

mina or manganese. The high percentage of silica derived from the sand puts the larger portion of it in so low a grade as to render it unfit for industrial uses.

A number of experiments were made with this low-grade ore to ascertain whether a portion of the sand and other impurities could be separated and the iron content raised to a percentage high enough to make it valuable. The best results were obtained by a washing process such as is used in low-grade propositions in Alabama, and a temporary plant was built which has fulfilled all expectations.

The operation is as follows: The low-grade ore, consisting of the heavy hematite and the lighter sand, is mixed at the head of the plant with water by washing from a drop bottom steel car into a bin. From this it is fed to an inclined cylindrical drum, which has 2-in. perforations at frequent intervals throughout. Material passing through the drum drops up-



One View of Canisteo Pit at Coleraine



Ore Washing Plant, Coleraine.

they have shipped approximately 10,000,000 tons of ore. The Mahoning is stripped in such a manner that passenger trains can be taken into and through the mine itself, a somewhat unique feat. The mine is operated by the Mahoning Iron & Steel Co., and the fee is owned by the Great Northern Railway Co. A total of 3,500,000 tons of overburden has been removed.

The closing session of the Institute was called to order in the evening by President Cole in Close's hall. The High School orchestra rendered excellent music, and Rev. Frank Durant delivered the address of welcome, to which President Cole responded.

John Hearling of Eveleth read a paper on biographical sketches, and recommended that a department of biographies be established by the institute to include sketches of members of earlier days, and to be published from time to time. He paid a high tribute to Peter White, who died recently.

A. M. Gow of Duluth read a paper on "The Oliver Iron Mining Co.'s Standard Boiler House." Thomas W. Orison of Appleton, Wis., and F. H. Armstrong of Vulcan described "The Hydro-Electric Plant of the Pcon Iron Mining Co."

turned over to the members of the institute and their guests, and refreshments were served up to the time of the departure of the trains.

SATURDAY, JUNE 27.

Coleraine, the scene of the vast operations of the Oliver Iron Mining Co., was reached in the early morning, and the visitors were greeted by John C. Greenway, general superintendent, and members of his staff and a band. The Hibbing flat cars were again brought into use and the visitors were taken through the various workings of the mammoth open pits.

Of great interest was the visit to the experimental washing plant which was designed to treat the sandy ores of the company. The surface deposits of the Coleraine section are of glacial origin, consisting of clay and very fine sand intimately mixed, layers of gravel running through the soil at varying depths. Taconite boulders do not occur as frequently as in the more easterly portions of the range, yet ledges of taconite generally underlie the ore.

The ore itself exists largely as decomposed hematite in a fine state of subdivision, intimately mixed with free sand, containing very little phosphorous, alu-

on a log washer, where the greater part of the separation of iron and sand occurs.

The material in the log washer is forced up an incline by the logs, with a churning motion, in the presence of a large amount of water. The water under pressure, having been forced into the ore at each operation, including the passage through the drum, has formed a thin quicksand with the fine silt and lighter substances. During the passage of material up the incline most of this quicksand is washed back by reason of its light weight, to the lowest portion of the trough on the incline; from here it passes over the edge, while the heavier material, consisting principally of clean ore, stays upon the bottom of the trough and is churned up the incline into another drum, the water being unable to wash it back because of its weight.

This drum is finely perforated and frees the ore of any sand left unseparated by the log washer. While going through this drum water under pressure plays on the material, aiding greatly the operation of sifting. The material thus treated is hoisted up an inclined skip-road, and is dumped into a drop-bottom steel car.

The material not passing through the 2-in. perforations in the first drum passes on to a traveling belt, where the rock is removed and ore dumps into a bin, from which it is hoisted to cars. The

large pieces which do not pass through the perforations of the 2-in. drum consist of undecomposed hematite, not being sufficiently fine to become intimately mixed with the sand, its percentage of iron being high enough to render further treatment unnecessary.

By washing the ore in this manner material containing only 45% iron has been raised to 60%.

The stripping development at Coleraine is worthy of especial note, not only for its magnitude, both in extent and area and depth of overburden to be moved, but in the labor-saving methods utilized and in the amount of earth removed month by month. The overburden so far removed amounts to 2,475,000 yds., and from the nearby Holman mine 1,600,000 yds. has been taken.

A visit was paid to the well-appointed offices of the company and to the High School building, which was named after Superintendent Greenway.

The town of Coleraine is being built up as a model dwelling place with all necessary comforts and conveniences, and of the employees of the company.

The master mind of this great undertaking at Coleraine is John C. Greenway, who, though a young man, has demonstrated his ability to handle this great problem successfully. He has gathered around him a staff of young men of ability, and with unlimited capital at his command will realize for his company every success anticipated.

The return trip to Duluth was begun at noon, reaching that city at 4 o'clock, where was ended a most enjoyable and interesting four days' trip.

### British Foreign Fuel Trade.

For the five months ending with May the exports of fuel from Great Britain were as follows: Coal, 24,976,174 long tons, as against 24,354,681 tons in 1907; coke, 436,765 tons against 354,333 tons; briquets, 611,838 tons against 573,885 tons; total, 26,024,779 tons, as against 25,282,890 tons in 1907.

In addition, there were shipped for consumption on vessels engaged in foreign trade, 5,952,461 tons of bunker coal, which compares with 7,592,875 tons for the corresponding period in 1907.

Of this year's exports of coal, France received 4,503,830 tons, against 4,567,011 tons in 1907; Germany, 3,789,802 tons against 3,382,734 tons; Holland, 1,035,154 tons against 1,175,145 tons; Italy, 3,455,234 tons against 3,371,836 tons; Sweden, 1,360,118 tons against 1,204,388 tons; Spain and Canaries, 1,102,181 tons against 1,094,293 tons; Argentina, 1,091,288 tons against 911,990 tons; Egypt, 953,038 tons against 1,159,407 tons; United States, 5,162 tons against 23,000 tons; while the remainder went to various other countries.

**British Lead Trade.**—The imports of lead into Great Britain for the first five months this year amounted to 99,198 long tons, as against 81,985 tons in 1907; an increase of 17,213 tons, or 21%. Exports were 23,488 tons, as against 22,411 tons in 1907; an increase of 1,077 tons, or nearly 5%.

### Working Deep Gravels in Alaska.

BY L. M. PRINGLE.\*

The methods of working the deep gravels of the Fairbanks region in Alaska are similar to those employed elsewhere, with the modifications rendered necessary by the frozen character of the ground. These methods have gradually developed in the Yukon territory and in Alaska, and from year to year have become more efficient in solving the problems that are met.

In the Fairbanks region in 1903 thawing was accomplished by the cruder methods mentioned, and equipments for thawing by steam, which had been found so effective in the Klondike region, were not plentiful. Since then extensive steam plants have been introduced, capable of thawing and handling daily large quantities of gravel.

The process in general includes the following operations:

1. The sinking of a shaft to bed rock, ranging in depth from 20 to 300 ft or more.
2. The timbering of the shaft and the portion of the drifts near the shaft.
3. The opening up of the ground by drifts which are run either parallel to or across the pay streak and from which crosscuts are driven.
4. The extraction of the gravel from the crosscuts, beginning at the farther limits of the drifts and working toward the shaft.
5. The hoisting of the pay gravel with as little waste as possible to the surface.
6. The recovery of the gold by ordinary sluicing.

The main drift is usually carried to a maximum distance of about 200 ft, in each direction from the shaft, and the ground is blocked off by crosscuts having a variable length up to about 100 ft. Fortunately but little timbering is generally required. Where the ground is weak, pillars are left at intervals of about 25 ft, when working back the faces toward the shaft.

Ordinarily, as mining commences at the extreme limit of the area to be worked, the ground from which the pay dirt has been removed is allowed to settle if it will. Experience has shown that settling is generally so gradual that the work can be carried away from the settling ground with sufficient speed to avoid trouble.

The steam point method of thawing is the one most commonly in use. The steam point is a piece of  $\frac{1}{2}$  or  $\frac{3}{4}$  in. hydraulic pipe, 5 to 8 ft or more in length, with a blunt, hollow point of tool steel for piercing the ground and a solid head of tool steel or machine steel, sufficiently strong to withstand the impact of a maul or sledge.

Steam is admitted through a pipe fitted laterally in a small aperture near the head. The points are placed about 2½ ft. apart, and from a dozen to 20 or more are used in a plant of average size. The power needed is 1 to 2 h. p. per point, and the duty of a point is 3 to 4 cu. yds. or more per day of 10 hours.

\*Extract from Bulletin No. 337 (1908), U. S. Geol. Survey.

In use the point is driven in gradually as the ground becomes thawed.

It is customary in most places to use either hot water at a temperature of about 140 degs. F. or a mixture of hot water and steam while driving the points, and then to complete the thawing by means of steam alone, since by employing hot water in a part of the operation the atmosphere of the mine does not become so vitiated through the condensation of the steam and the conditions for working are consequently better.

Hot water hydraulicking by means of the pulsometer or other steam pump has been very successful in some places. Pulsometers are reported to do the work of 20 points, and as by this method a jet of hot water is thrown forcefully against the frozen face, the gold particles are more easily released from adhesive material in which they may be embedded than by the use of points.

Pulsometers are generally suspended in a sump at the bottom of the shaft, and the hot water is supplied by siphon from the boiler. Surplus water is generally removed by centrifugal pumps. It seems probable that hot water hydraulicking will be more generally employed.

After thawing, the gravel is removed with pick and shovel and carried by wheelbarrows to the shaft, where it is hoisted to the surface by buckets attached generally to an automatic trolley. In summer it is conveyed directly to the sluice boxes, or when the water for sluicing is available for only part of the shift, to a hopper connected with the set of boxes.

In winter the gravel is conveyed to a dump under which sets of boxes have been arranged and later, in the spring, it is passed through the sluices. Ground which stands well without timbering is worked both winter and summer, but summer work is cheaper. Ground having a tendency to cave is often left for winter exploitation, as it is found that the expense of rehandling in the spring is more than counterbalanced by the greater facility with which the gravel can be extracted.

The ordinary sluice boxes with pole riffles are universally employed, usually 12 by 14 ins. in cross section and 12 ft. long. An average size dump box or rock box is 20 to 22 ft. in length and 36 to 40 ins. or more in width. This catches from 60 to 90% of all the gold saved, and most of the remainder is caught in the next three boxes, which have grades generally ranging from 9 to 12 ins. to the box.

Ordinarily two clean-ups a week are made. The concentrates are dried in mining pans on stoves or blacksmiths' forges, and as a rule are cleaned by dry panning and blowing.

**Mineral Exports from Colombia.**—During 1907 the exports through the port of Cartagena, Colombia, were: Gold, \$2,011,559; gold and platinum mixed, \$15,223; silver, \$42,084; gold and silver coin, \$20,991; platinum, \$98,597. Of these exports the United States received: Gold, \$1,117,338; gold and platinum mixed, \$44,082; silver, \$42,004; gold and silver coin, \$20,991; platinum, \$57,716.



## Some Notes on Honduras.

BY C. F. SPALDING.\*

Spanish Honduras is one of the richest mineral countries in the world, though very little is known about it, the many revolutions keeping capital out. During the Spanish occupancy something like \$500,000,000 in gold was shipped to Spain. This does not take into account the gold stolen and otherwise disposed of.

The gold output has been and is now chiefly placer gold. Every little town and settlement in the interior has its placer miners who work out a few ounces, then dispose of same to merchants. They wash with bateas, pans and horn spoons, just as their fathers have done before them for generations. The miners hunt up a place that runs \$30 or \$35 and up per yard, sit down there with their batea and a spoon, scoop up the sand and gravel with the spoon, load it on to the batea and average an ounce of gold in two or three days. This ground if it were in the United States would cause the biggest kind of a stampede, and there is lots of it in Honduras.

The natives never have capital enough to wash on a large scale, know nothing about sluice boxes or even rockers, and as several told me, "what is the use to have the worry and care of sluices when we can get more than enough to satisfy ourselves with pans and bateas?"

You can find gold in paying quantities in practically all the rivers and streams on the east side of the mountains. There are several of the finest dredging propositions in the world to be found in Honduras, but the country as a whole is too rough and rugged for dredging, the ground carrying too many large boulders.

One great disadvantage in attempting anything here in the mining line is the lack of transportation facilities as there are no wagon roads in the interior except a couple that have been built by private capital into their mines. The only railroad is that from Puerto Cortez to Pimienta. The government is working on a survey for a railroad from Truxillo to Tegucigalpa, the capital.

As it is now, all mining machinery and supplies have to be transported on mule back or hauled on sledges by oxen. Cargo mules average five to eight leagues per day, if in good condition and no feasts days happen along when every one stops work and celebrates. The average cargo is 200 lbs. and charges 40 to 50 cents silver per league. A league, except on government surveyed trails, is a variable quantity, from two to four miles, arrived at by the distance a mule will travel in an hour.

The formation of the country between Minas de Oro and Pimienta is mainly granite, and the more acid eruptives with limestone and sandstone cappings on the mountains and high ridges. On an extended trip you will see almost everything in the rock line.

The country is very hard to prospect owing to the heavy vegetable growth, it being almost impossible to cut off the beaten trails. Around Santa Cruz a good

deal of trap rock crops out, and the eruptive cropings are in general more basic than the surrounding country. The trap resembles very much the Michigan traps and also carries native copper. I saw in one place a stone fence approximately a half mile long built from this trap, and in a number of places you could see the copper sticking out of the rock.

Near Santa Cruz a native showed me a piece of pure stibnite that would easily weigh 100 lbs. He said that he picked it up on a side hill and that there was a large space covered with the same mineral. This and the copper would be very valuable deposits if there were transportation facilities. At present these deposits are inaccessible and practically of no value.

A hard thing for an American in the interior is the grub question. The natives exist on tortillas and frijoles and occasionally an egg or a piece of meat.

The tortillas are made by boiling corn in a large kettle with wood ashes and lime, grinding the boiled corn on a flat stone to a paste, moistening with a little water, flattening into a round cake 5 to 6 ins. in diameter and  $\frac{3}{4}$  in. thick, and finally frying on a piece of sheet iron. Nothing is added in the shape of baking powder to make the corn cakes light, and not even a pinch of salt is used to give them a flavor. This food, however, is nourishing, but mighty hard to get accustomed to as it is tasteless.

The frijoles are red beans boiled for a couple of hours. Sometimes they are mashed and fried with a little lard; then they are pretty good. A continuous diet of frijoles and tortillas three times a day, day in and day out, gets pretty tiresome. Anything else in the eating line has to be packed in from the coast.

We have Wagner's principles for the "simple life" beaten to a standstill down here. Plates, knives and forks are unknown on the trail. You go into a native house for a meal, they bring in the tortillas and frijoles on banana leaves. You help yourself to a tortilla for a plate, scrape onto it some frijoles, then eat plate and all. This is very handy as it saves dish washing.

The houses seldom have more than one room. When you get ready to retire you select a couple of rafters, sling up your hammock and turn in all standing, taking care to hang up your boots, otherwise the pigs and goats will eat them up before morning.

The whole family, including the live stock, occupy the same room with you, and as they close all doors and windows the atmosphere before morning is very close, especially if there happens to be a pack train stopping at the same house as they always bring in the pack saddles, otherwise the saddles, which are built of bundles of rushes, would be eaten up before morning. When these saddles have been in use for several weeks on a sore backed mule and have gotten thoroughly soaked with pus and matter from the sores, the odor can be imagined but not described.

The native beds are made by stitching a green cowhide over a wooden frame. When that dries it gets as stiff and hard

as a board, and as they don't use springs and mattresses it is a very comfortable (?) affair to sleep on. Glass windows are rare; you never see them in the interior and very seldom in the large towns; wooden shutters take their place, and bugs and all kinds of insects have full sway.

Honduras is a wonderfully rich country in minerals, tropical fruits and woods. If better known it would be opened up pretty quickly. There is an excellent chance for the investment of capital. If you don't like mining, try planting bananas, coffee, rubber, or valuable woods, such as mahogany, rosewood, etc., or what would be a real good thing is the pine.

Few people in the United States know that there are numerous pine tracts in the interior which can be gotten hold of very cheaply. For instance, one tract of 14,000 acres, heavily timbered, was sold, or rather the timber was sold, for a flat rate of 1 cent per tree for all trees over 9 ins., the money to be paid as the trees were cut. Some pines on this tract are 5 ft. through at the butt, good sound timber—all for 1 cent per tree. There are other chances just as good.

## American Cement Trade.

Importers are not doing so large a trade as characterized the early months of last year.

The total imports of cement into the United States for the first quarter of 1908 amounted to 165,305,302 lbs., valued at \$567,228. Compared with the corresponding period in 1907, when the imports were 231,404,284 lbs., valued at \$705,528, there is shown a decrease in 1908 of 28.6% in quantity and 19.6% in value.

The imports, according to country, for the first quarter of this year and last, were as below, in pounds:

	1907.	1908.	Changes.
Belgium	71,231,649	65,166,868	D. 6,071,663
France	3,058,660	957,400	D. 2,121,400
Germany	162,639,360	55,252,188	D. 47,287,172
Gr. Brit.	52,961,376	42,260,730	D. 10,696,646
Other	728,349	1,274,864	I. 546,515
Total	220,410,554	164,971,186	D. 55,439,368
Canada	26,690	71,660	I. 44,970
U. S. C. M.	999,180	329,114	D. 669,066
Total	221,436,324	165,305,302	D. 56,131,022
Re-exports	1,363,099	1,023,966	D. 339,133
Balance	220,073,225	164,281,336	D. 55,791,889

The total value of the net imports this year is \$564,238, which compared with \$701,178 in 1907, shows a falling off of \$136,940.

Exports of domestic cement for the first quarter this year were 82,951,200 lbs., valued at \$321,204. Compared with 73,174,400 lbs., valued at \$299,271 in 1907, the increase shown in 1908 is equivalent to 13.3% in quantity, and 7.3% in value.

A ferruginous clay of a light red color and known as Gil-*Armen*, dug in Khorasan, India, is eaten as a medicine. An analysis shows: Silica, 67.57%; ferric oxide, 3.76%; alumina, 7.85%; lime, 2.76%; magnesia, 0.98%; potash, 0.67%; soda, 0.38%; sulphuric acid, 0.06%; phosphoric anhydride, 0.11%; loss on ignition, 13.04%; total, 100%.

\*Consulting engineer, Puerto Cortez, Honduras, C. A.

# Utilization of Blast Furnace Slag for Bricks, Etc.

By C. DE SCHWARZ.\*

Metallurgist.

Taking the total production at all blast furnace works in the world at about 50,000,000 tons of blast furnace slag for the last year, and assuming further that 1 ton of ungranulated slag measures, when broken up, about 20 cu. ft., the slag produced in one year represents a mountain of nearly 1,000,000,000 cu. ft.

John Payne, an Englishman, was the first who succeeded in utilizing blast furnace slag for big solid blocks—up to 3 tons in weight—which were successfully used for river and canal embankments. His method was patented in 1728.

Fritz Lürmann, when at Osnabrück, was the first who recognized and also utilized the hydraulic properties of granulated basic blast furnace slag for making bricks by mixing granulated blast furnace slag with lime cream and pressing this mixture into molds. The lime thus combining with the free silica in the granulated slag served as a cement, and the bricks became hard on free exposure to

*Early inventions. Improvements in apparatus for feeding, mixing and pressing granulated blast furnace slag and lime into bricks. Properties of cement made from slag. Advantages in using slag brick, stone and cement.*

*Thoman, Mathesius, Renfert, Canaris and other processes for manufacturing slag brick and stone. Collocus slag cement method. A unique ball mill with air separator for grinding slag.*

slaked lime and the granulated slag was obtained.

3. A press, especially constructed for making slag bricks, was employed. In the first instance the maximum pressure was raised to about 3,500 lbs. per sq. in. Secondly, the press was constructed in such a way as to do its work with a gradually increasing pressure, instead of, as before, by means of a heavy shock. The latter had a double advantage: firstly, the high pressure was transmitted up to the very interior of the brick, which was not the case when the press worked with a shock; and secondly, all superfluous moisture was squeezed out.

4. In order to avoid, as much as possible, any loss from bricks bursting, on account of small particles of unslaked lime being entangled and enclosed in the interior of the brick the slaked lime had, before use, to pass through a ball mill, where it was reduced to fine powder and intimately mixed, whereby a complete conversion of any free lime into hydrate of lime was ensured.

One such press with its accessories, as mentioned before, produces about 2,000 slag bricks per hour, the whole requiring about 25 h. p. to drive it.

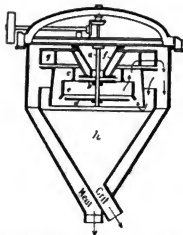
One slag brick of ordinary size, manufactured in the way described, weighs on an average 8 lbs., and has a maximum crushing strength of 1,700 lbs. per sq. in. The working expenses (lime, wages, repairs, and motive power) are stated to be about \$5 (\$1.94) per 1,000 bricks of ordinary size.

A brick press, also constructed for making slag bricks, was recently invented by Paul Thoman in Germany. The peculiarity of this press consists of an improved mixing apparatus, of special construction, for mixing slaked lime and granulated slag, as well as in a peculiar method of pressing the bricks. The process is as follows: Slaked lime and granulated slag coming from an automatic feeder are led to the mixing apparatus by means of a hand conveyor. The mixing apparatus consists of a small cylindrical sheet iron vessel containing a mixer with screw-like arms of peculiar shape, in which the materials are, owing to quick

rotation, intimately mixed within a short time.

The mixture of sand and slaked lime thus produced falls, by means of a hopper, into the brick press. The peculiarity of the latter consists in an arrangement by means of which the brick is formed in layers, each layer being hammered down separately, one above the other, until the brick mold is filled up. This arrangement has the advantage of cheaper working expenses and less initial outlay. The bricks produced by this machine are also less heavy and have a rough surface, the latter being preferred by masons.

Another method of making slag bricks, still in use, consists in mixing one part of Portland cement with from four to five parts of granulated slag and passing this mixture into molds. These bricks must remain in the mold for 24 to 30 hours after being pressed. As they are not allowed to harden in the open they have to remain, after having been taken out from the mold, for six to eight weeks



Vertical Section Through Air Separator.

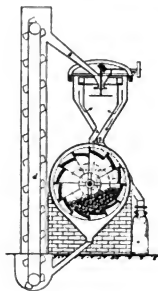
the atmosphere within about six to eight weeks.

The slag bricks produced at the beginning were, however, of inferior quality, and could, on account of their insufficient strength, only be used for masonry of minor importance. It was also found that, during the time of hardening, a good many bricks cracked and fell to pieces.

Considerable improvements were made later on, namely:

1. An automatic feeding apparatus was provided, having for its purpose the maintenance of the proper proportions between the granulated slag and the slaked lime, ascertained by experiment, instead of leaving these proportions to be adjusted, as before, by the workmen employed. In general it was found that an addition of 150 lbs. of dry slaked lime to 850 lbs. of granulated slag, containing on an average 20% of water, answered the purpose pretty well.

2. Appliances were employed by means of which an intimate mixture between the



Ball Mill, Air Separator and Elevator.

in a covered shed, well protected against sun and wind, where they are moistened from time to time.

The bricks produced in this way are of very good quality, but their cost of manufacture is high, requiring also a considerably high initial outlay; it can therefore only be recommended for making artificial stones of special size, staircase steps, slabs, etc.

The best slag bricks, so far as exact shape and dimensions as well as great hardness and resistance to crushing are concerned, are manufactured by the English method.

According to this process blast furnace slag can be made into bricks or stones without any addition of cement, slaked lime, or any binding medium. It is based on the fact that insoluble silica is rendered soluble, that is, ready for combination,

\*Abstract of paper read before British Iron & Steel Inst., May, 1908.

if exposed to high steam pressure during a certain lapse of time.

The bricks can be transported to their destination and used for masonry as soon as they have left the hardening chamber. For this method of manufacturing bricks blast furnace slag from the old heaps, even if exposed to free air for several years, can be utilized.

The cost of producing 1,000 bricks of ordinary size is stated to be 13s (\$314).

Slag bricks have the following advantages over ordinary baked clay bricks: (1) They have a considerably higher resistance against crushing. (2) Houses built with slag bricks are never damp, and can be occupied without danger to health as soon as they are built. (3) Slag bricks are more accurate in shape and dimensions, because they are not baked, and therefore do not shrink like clay bricks.

For certain purposes these slag bricks are, on account of their accurate shape and extreme hardness, preferred even to natural stone; for instance, in Brussels such bricks are used for facing of walls for houses (verblendsteine), and paid for at the rate of 60 francs (\$11.58) per 1,000. For ordinary masonry, slag bricks manufactured according to other methods, are used because they are considerably cheaper.

Of considerable more importance than the manufacture of slag bricks and stones, with reference to the utilization of slag, is the manufacture of cement. This is principally due to the fact that cement, weight for weight, sells at a rate which is about four times as high as that of bricks.

It has been repeatedly stated that no cement can be made from slag resulting from the manufacture of white pig iron. This is incorrect, as may be proved by the fact that Portland cement of good quality can be made from such slag, containing 12% of lime and 14% of oxide of manganese.

The cement made from such slag showed not the slightest trace of instability of volume even after six years' use; it also stood all the tests required by the standards for Portland cement. The manganese oxide in the cement gave it a somewhat brownish color, which, however, was not considered a fault by some customers, but on the contrary was preferred to the ordinary tint for making artificial stones.

To a certain extent the presence of metal oxides, such as those of iron and manganese, which, as a rule, are higher in slag from white pig iron, renders the cement made from it more apt to resist the influences of sea water.

Secondly, the presence of metallic oxides reduces the temperature of firing, necessary for the formation of clinker, thus effecting a saving in fuel.

As the majority of blast furnace slag produced nowadays results from white Thomas pig, it may be considered advisable to draw attention to this fact, as hitherto the general belief was that only slag resulting from gray pig can be used for making cement on account of its higher percentage of lime and its small percentage of manganese oxide.

It has been proved that a high percentage of lime in Portland cement is not only

not necessary, but is to a certain extent even injurious, as, being to a certain extent free, it causes the cement to "blow." Therefore such cement, rich in lime, must, as every experienced cement maker knows, be kept for some time in a cement silo before being ready for use, in order to give it time and opportunity to absorb carbonic acid and water from the air for the purpose of converting the free lime it contains into carbonate of lime and into hydrate of lime, respectively. Experience has also shown that cement, rich in lime cannot be used advantageously for buildings in sea water.

A new process of making cement from blast furnace slag has been invented by Prof. Mathiesius at Charlottenburg. This process is based on the principle, that insoluble combined silica can be turned into the soluble, combinable state by exposure to high steam pressure. The process is described as follows:

The blast furnace slag is allowed to cool down, when it is put into boilers, where it is exposed to steam pressure, until it is reduced to powder. Results of experiments have proved that slag, thus treated, had acquired hydraulic properties, but nothing has been done as yet to start works on a commercial scale.

Mr. Renfert, starting on the same principle, took out a patent according to which granulated blast furnace slag was treated with steam, but subsequently mixed with lime. This mixture being ground to a very fine powder, yields a cement of superior quality. Notwithstanding, after experimenting for some time, the inventor abandoned his process on account of too high working expenses.

Mr. Canaris invented a process according to which hot liquid blast furnace slag, containing not less than 40% of basic matter, is cooled down suddenly by mixing it with thin lime cream. The product thus received is then ground into powder, and after that supposed to be cement. This process has some resemblance to the Wolff & Lessing process. Neither the Canaris process nor that of Wolff & Lessing have found their way into practice, and will hardly ever do so.

Timm, Hays, and others have invented different arrangements for granulating slag without water, but, none of them having been carried out in practice, no opinion can be given about them.

Of all the processes of making cement from blast furnace slag invented recently, it appears that only one has as yet been accompanied with success, namely, the Colloseus process, called so after the name of the inventor.

According to this process, solutions of alkaline salts are injected into the hot liquid slag and thus intimately mixed with the latter, the nature and concentration of the injected solutions depending on the chemical composition of the slag, principally on its contents of lime. The quantity of the solution to be injected should be as high as possible; however, the slag thus treated must be perfectly dry after the operation. The salts used for preparing the solutions are principally alum, sulphate of magnesia, and nitrate of lime. The concentration, as a rule, varies from

2 to 5% of salt to from 95 to 98% of water.

On account of the great heat, the salts are decomposed, most of the sulphur escaping as sulphurous acid and sulphurated hydrogen. The slag is chemically and physically changed, and gets the appearance of a porous clinker easily broken up and reduced to powder.

In case slag with a comparatively high percentage of silica and a lower percentage of lime is to be converted into cement, the concentration of the alkaline solution is raised to a maximum of 10% of the salt to 90% of water; besides this a small addition of common cement, clinker rich in lime, has been found beneficial in such cases.

At the beginning the Colloseus process did not prove successful, principally on account of deficient construction of the granulating apparatus, which did not allow of an intimate mixture between the solutions and the slag. At the same time the selection of the blast furnace where the first apparatus was put up was not a very fortunate one, as it suffered continually on account of interruptions; besides this there was not sufficient space and other inconveniences. Under these circumstances it was impossible to produce cement of a satisfactory or regular quality.

Lately, however, these deficiencies have been overcome by employing an improved apparatus, which the following description will serve to explain.

The drum fixed on the shaft is divided into six interior partitions by means of cast iron ribs. On the outside the drum is provided with a number of other radial ribs running, like the former, parallel with the shaft. Between the ribs a number of longitudinal openings are arranged to provide communication between the interior and the outside of the drum, the latter revolving at the rate of about 650 revolutions per minute. On this drum the hot liquid slag, coming from the blast furnace, is led by means of a channel, the whole apparatus being enclosed.

Two funnels fixed on the easing contain the tubes that lead the alkaline solutions to the revolving drums. At the same time through these funnels cool air is sucked into the interior of the drum along with the alkaline solutions and, the quick revolving drum acting like an exhauster, thrown out together through openings with a certain force. In order to insure a proper distribution for the entrance of the solutions into the interior of the tambour, two ring tubes perforated with little holes are provided.

The slag being thus intimately mixed with the alkaline solution, is hurled with great force against the casing from where it falls by means of an incline into little bogies to be transported to the crushing mills.

From this description it may be seen that the working expenses for making cement from blast furnace slag according to this process must be exceedingly low, and the initial outlay for erecting such works very moderate, as the drying and grinding of raw materials, as well as brick making and the burning of clinker, is avoided.

As to the quality of this cement, it may

he said that, according to information received, it has stood all the tests prescribed for Portland cement by English, French, and German authorities. The cement has been employed for about a year in the erection of viaducts, railway embankments, bridges, houses, etc., showing, up to date, not the slightest trace of damage.

It had several times been pointed out as a drawback to the utilization of blast furnace slag that the latter is more difficult to grind than natural raw materials. This reproach is, up to a certain extent, justified, although this difficulty is already largely overcome by granulating the slag, whereby the latter, being cooled down very suddenly, becomes exceedingly brittle.

In addition to this, crushing mills have been recently invented specially well adapted for grinding slag, and have proved a great success in practice. The ball mill with air separator invented by Mumford & Moodie, and made by the Brothers Pfeiffer at Kaiserslautern, Germany, affords an instance of such a mill.

The following is a description of this apparatus: In the accompanying illustration of a vertical section through the air separator, the latter represents, as it were, the backbone of the whole arrangement;  $k$  is an exhaustor, fixed, like the two discs  $b$  and  $d$ , on the quickly revolving vertical shaft  $a$ .

The ground material (raw meal or cement) coming from the ball mill drops into the funnel  $f$ , and from there on to the disc  $b$ , from where, by means of centrifugal power, it is hurled against the ring  $c$ . From there it falls on a second disc  $d$ , the latter being of greater diameter than the former. From this disc, again, the material is hurled towards the ring  $e$ . This arrangement has for its prime purpose to distribute the material as much as possible in the air enclosed by the rings  $c$  and  $e$ . Through the ring  $e$ , which is open below, the air is sucked on by the exhaustor  $k$ , and enters the interior of the two rings  $c$  and  $e$ , as shown by arrows, taking the fine, finished material along with it, which, after having passed through the exhaustor  $g$ , enters the chamber closed in by the outer casing and drops, as shown by arrows, out of the apparatus to be transported to its destination, while the air being sucked up by the exhaustor, re-enters the chamber enclosed by the two rings  $c$  and  $e$ . The unfinished material, or grit, drops from the lower disc  $d$ , into the funnel  $h$ , and then into the crushing mill to be ground again.

This arrangement has been found very convenient and economical, as all the slag which is ground fine enough is separated and carried away to its destination instead of being unnecessarily ground over again and again, as is done with the so-called tube finishing mill, the latter thus causing loss of time and of driving power.

The arrangement of a complete set, as illustrated herewith, consists of a ball mill, air separator, and elevator. They are manufactured in different sizes for a production of from 1 to 9 tons of finished material per hour, leaving about 12% of residue on a sieve with 30,000 meshes per square inch.

## The Correlation of International Strata-II.

BY HORACE F. EVANS.

For a number of years it had been evident to the members of the Canadian Geological Survey, working in British Columbia and in the Rocky mountains proper, that rocks of Cambrian age possess a great extension in that province and are in some localities developed to great thickness.

For a long time there was no direct evidences of Cambrian rocks occurring within the southern interior (Interior Plateau) of British Columbia, and it further appeared that their recognition as rocks of Cambrian age was dependent on several intermediate links by which certain rocks are correlated with the great Cambrian series developed in the corresponding part of the length of the Rocky mountains proper.

These rocks, in addition to others believed to be Archæan, were largely examined in 1877 on Shuswap lake in British Columbia. At that time there was no definite information as to the age of these rocks. In 1888 the shores of Adams lake, a body of water 37 miles long, lying to the west of the Great Shuswap lake, were examined.

The next year, rocks similar to those found near Adams lake were noted and studied in the vicinity of Kootenay lake. The lower and what is believed to be the Archæan series was there recognized together with a great thickness of overlying rocks which consisted of black micaceous argillites superimposed on which are gray and green schists. These rocks at the time were believed to be the same as those previously described near Adams and Shuswap lakes.

Later on when the west Kootenay region was examined, a general section was given. This combined results of work in that region with those previously obtained in Shuswap and Adams lakes, and these rock series, thus determined, were classified under the provincial names of Shuswap (Archæan), Nisconolith and Adams lake (Cambrian) series.

It was ascertained that the gray and greenish schists of Kootenay lake comprised the second group, and on examination their composition was found to consist of altered volcanic, and their schistose structure was ascribed to the great pressure to which they had been subjected during the movements of the earth's crusts at the time of the general uplift, and the extrusion of the great plutonic masses in evidence.

It was further noted in the report that although some evidence of this change dependent on dynamic alteration occurred in Kootenay district itself, the best evidence was obtained between Adams and Shuswap lakes and the North and South Thompson rivers.

The next step was to make a connection between the older rocks of the Interior Plateau of British Columbia, the Gold ranges and the western flank of the Selkirk range with those to the eastward of the Rocky mountains proper; the last named having been examined along the Bow river pass in 1887.

In the autumn of 1890 an examination was made by Dawson in the line of the

Canadian Pacific railway across the entire width of the Selkirk range. The official report of this states that a fairly satisfactory correlation of the different developments of the older rocks was made, and Dawson himself published a paper on the subject in December, 1890, in the Transactions of the Geological Society of America.

It is asserted that the comparison thus instituted rendered it possible to correlate a large part of the rocks previously observed at Kootenay, Shuswap and Adams lakes, together with, at least, some of those of the Interior Plateau of British Columbia with the known Cambrian strata of the Rocky mountains proper. But it has always appeared to the independent observer that much of this work needs revision, because the region under consideration is extensive and very complex in character, and the work was new and much of it was hastily done.

I wish to accentuate the fact that it was in the Rocky mountain section alone that any paleontological evidence was available, in the first instance, by which to fix the precise age of the strata of the Rocky mountains proper, and those of the Interior Plateau region were made solely on lithologic grounds.

Therefore, it becomes absolutely necessary to apply the paleontological method if an exact correlation between the Rocky mountains proper and the Interior Plateau region is to be the result of future work.

As with the Carboniferous, so with the Cambrian, the Canadian geologists appear to have proceeded entirely on lithologic grounds.

Dr. Daly, a geologist of excellent ability, when writing of the rocks of the international boundary between British Columbia and Washington, lamented the "amazing scarcity of fossils"; yet his complaint should have been directed against the "amazing scarcity" of investigation—against the disappearance or the nonappearance of the paleontologist in the field—alongside of the geologist.

## American Trade in Bagdad.

It should be borne in mind that goods arriving in Bagdad in Asiatic Turkey are not only for local consumption, but that this is a distributing center for Mesopotamia and the northwestern part of Persia.

It is probable that if this business can be properly organized and conducted in Bagdad depots can to good advantage be established in Kermanshah and Hamadan, two important trading points in Persia.

Bagdad has no newspapers in which it would pay to advertise. There is really but one publication, and that devotes its columns entirely to government notices, transfers of officials, and recipients of decorations bestowed by the Sultan. One way of placing goods before the native population would be to send descriptive pamphlets, attractively illustrated, printed in the Arabic language, for distribution in this territory. Another effective method of creating trade in Asiatic Turkey is to make the acquaintance of dealers and consumers by advertising in The Mining World.

## Trade Opportunities in East Africa.

BY CALVIN F. SMITH.\*

For years Zanzibar was the entrepot for Africa. Trade routes centered here, ivory and other products from the interior of the African continent were brought here and exchanged for the cotton goods and trinkets which formed the medium of exchange with the natives. Ships from Europe and America discharged their cargoes here and carried back the ivory, cloves, and skins. But all such products now find entrance and outlet through British and German East Africa.

It must not be inferred, however, that the trade of Zanzibar has decreased proportionately as the trade of the coast towns has increased. Barring the setback which the Zanzibar trade received by reason of the quarantine against the plague, the trade of Zanzibar is very good and has been so for some time. All the trade of Zanzibar and Pemba goes through Zanzibar.

The completion of the Uganda railroad from Mombasa to Port Florence on Lake Victoria Nyanza, 380 miles, suddenly brought Mombasa into prominence as one of the future mainland ports of East Africa, and this has been enhanced from year to year until now Mombasa is a port of call for all the regular steamship lines maintaining communication with Europe.

The Uganda railroad taps not only the heart of Central Africa, but draws a considerable amount of its carrying trade from sections of German East Africa not reached by the German railroads. Very little if any of the goods shipped to or from points served by the Uganda railroad reach Zanzibar for transshipment.

To add to all this the climate of the plateau behind the low coast belt was found favorable to Europeans, and modern towns began to spring up in that section, along the railroad, quite European in character, notably Nairobi and Machakos. European settlers came to those towns, inhabited the surrounding country and engaged in agriculture. This created a demand for agricultural and labor saving machines. Some American manufacturers have taken advantage of this opportunity. A commercial campaign to secure a fair share of this trade must be conducted from Mombasa. Most of the commercial nations have consuls there looking after this trade. Mombasa has an excellent harbor, called Kilindini.

German East Africa has a simpler and more expeditious system for registering homesteads or plantations than British East Africa. It is pushing into the interior by two principal lines of railroad instead of one, and even more are projected. The northern line has Tanga for its port and taps the Kilimanjaro country, while the southern line extends inland from Dar-es-Salaam, the principal town in German East Africa and the place of residence of the governor. It is proposed to still further extend either one or both of these lines. The steamships of the German East African line call regularly at both Dar-es-Salaam and Tanga.

The Messageries Maritimes, German

East Africa, and the Peninsular and Oriental lines—the last named by change at Aden to the British India Line—maintain regular services from Europe to Zanzibar and East Africa.

The Messageries Maritimes has a monthly service from Marseille to Mombasa and Zanzibar, the boats, both coming and going, calling at Port Said, Suez, and Jibuti. The German East Africa line maintains a fortnightly service to Zanzibar and East Africa, the steamers, both incoming and going from Hamburg, calling at Flushing, Dover, Lisbon, Tangier, Marseille, Naples, Port Said, Suez, Aden, Mombasa, Tanga and Zanzibar. This route requires a few days more from Marseille. Transshipment of goods to and from the United States is usually made at Hamburg.

The Peninsular and Oriental steamers running between England and the eastern ports require transshipment at Aden. Regular communication is also maintained between Zanzibar and Bombay by two lines, and between the former place and the lesser coast towns, such as Lamu and Mogadishu, by various smaller steamers.

The Zanzibar Railroad Co., the Zanzibar Electric Light Co., and the Zanzibar Telephone Co. are three American corporations doing business in Zanzibar. The Zanzibar Railroad Co. has built and is operating a line of narrow gauge railroad from Zanzibar city to Bububi, seven miles distant. It is proposed to extend this road the entire length of the island, which will then form one of the principal means of communication between Zanzibar city and the island of Pemba.

The railroad starts at Palace square in the city and, after running through the Malindi district of the city and the Indian bazaar, follows the west coast of the island to its northern terminus. The trains consist of a locomotive built in Pittsburg, Pa., and two open cars and one chair car, built by the Brill Co., of Philadelphia. The chair car fare from one end to the other is one rupee, (about 32.4 cents). The fare on the open cars is considerably less. The road is well built with iron ties and good sized rails, but the climatic conditions of Zanzibar reduce the life of an iron tie. Little grading was required for the railroad, since the highest point on the island is said to be only 300 ft. above the sea level.

The Zanzibar Electric Light Co. has a splendid plant. The Sultan's palace as well as the houses of the Sultan's family and retainers are wired and lighted throughout. By means of a tower studded with incandescents lights, having an aggregate lighting capacity of 3,000 candlepower, the palace square is always brilliantly lighted. The streets are also well lighted by means of incandescent lights.

The telephone is steadily making its way into a great many business and official houses of Zanzibar, and bespeaks Zanzibar's progress in introducing modern inventions and installing all the facilities enjoyed by European and American towns of the same size.

Wireless communication was recently established between Zanzibar city and the island of Pemba. It is said that the mes-

sages are sent in Swahili, which is the language of the natives of Zanzibar and the parent of a great many native languages of the coast.

The principal mineral import from the United States is petroleum. There are, however, many articles of American manufacture exposed for sale here which do not figure in the custom house reports as American, because they are furnished by European merchants.

The standard of currency in Zanzibar and in German and British East Africa is the silver rupee, worth about 32.4 cents. In Zanzibar the other coins in use are the one-half and one-fourth rupee pieces silver, and the pie, a copper coin. German East Africa has introduced the German rupee, which is in value about the same as the Zanzibar rupee, but is not current in Zanzibar or British East Africa.

British East Africa has recently made a numismatic experiment in the introduction of aluminum money. The silver rupee still remains as the standard of currency, but instead of the former divisions into pie and annas the fractional aluminum coin is a cent. There are 100 cents to the rupee. The aluminum coins consist of 1, 5, and 10-cent pieces. The 10-cent piece is as large as the rupee. The aluminum coins do not have milled edges, but have round holes in the center. The newcomer at once notices the disadvantage of a coin as light in weight as an aluminum cent, but also the advantage to the native of the hole in the center so that the coins can be easily strung

## Export Trade with Denmark.

Aarhus, the principal city of the province of Jutland, the largest consuming province of Denmark, offers advantages for American exporters which have been neglected.

Weights of cargoes are taken by sworn government weighers, which seems satisfactory, and their is little complaint among the receivers on this score. It has been agreed among the wholesale dealers in Denmark that where a cargo is discharged for more than one buyer, and at one or more ports, the weights of all the different lots shall be equalized through a sort of clearing house, and if the full cargo holds out within 1% of invoice weight there is no reclamation on American shippers; but when there is a loss exceeding 1% each shipper has to stand a reclamation in proportion to the amount of his shipment on the steamer.

**Muck in Alluvial Deposits of Alaska.**—The muck ranges in thickness from a few feet to a maximum of about 70 ft., the line of separation between it and the underlying gravels being fairly sharp. The muck is a black deposit containing a large amount of material derived from the decomposition of moss and other vegetation, a considerable percentage of clay and sand being either intermingled with the organic matter or distributed as layers and thin lenses irregularly through the mass. Horizontal, and occasionally vertical, sheets of ice several feet thick occur in this deposit.

\*American consul at Zanzibar.

# Development of the Tin Fields of Queensland.

By A. R. MACDONALD.\*

Under Secretary for Mines.

Although the decline in the value of tin created some consternation among producers, the 1907 output showed an advance over that of the preceding year.

The greater part of our lode tin is still derived from the Walsh and Tinaro field, and here the Stannary Hills mines and Tramway Co., Ltd., claim precedence with an output of more than 700 tons of black tin. Most of this product was obtained from the extensive low-grade surface deposits of the Arlbonin hills mine, the richer ore being supplied by the Ivanhoe, Kitchener, and Extended leases, supplemented by smaller quantities from the Eclipse, Young Australia, Caledonia, and other mines belonging to the company. A large amount of dead work has been done during the year, and the connection of the company's various properties by means of tunnels designed to facilitate the opening up of ore bodies previously worked near the surface, is now almost completed.

The Lass of Gowrie (next to the Tramway Co.'s properties the most productive mine of the Stannary Hills center), although idle during the greater part of 1907 in consequence of a protracted action at law, from 127 tons of ore furnished 28 tons of black tin, and, with energetic management, may be relied upon for an increased output in almost any condition of the tin market. Odd parcels of ore have been supplied by several other mines in the neighborhood, but the general neglect to make provision for reasonable reserves of ore has brought more than one promising venture to an ignominious end.

Irvinebank is perhaps the most populous and thriving center of tin mining in the district, or indeed in the state. The striking of a small bunch of rich ore in the main shaft of the Vulcan, at a depth of 1,215 ft., apart from its significance as evidence that tin occurs in the deep ground, may, when the true value of the deposit is revealed by the new level opened in consequence of this find, prove to be an influential factor in prolonging the life of the mine. In the workings above the 1,050-ft. level, stopping operations have demonstrated a larger horizontal area of payable ore than was anticipated, and the mine may with confidence be expected to maintain its output during the current year.

The Tornado, which adjoins the Vulcan, and which, as the subject of litigation involving points of interest in connection with our mining law, has come into prominence during the year, for some 800 tons of ore, from a practically new find near the summit of the Tornado hill, obtained 80 tons of tin concentrates. At some distance lower down a tunnel has now been driven to the lode, which, with fuller development may prove to be of permanent value. The intention to erect a mill on this creek, to treat the Governor Norman ore, has been relinquished, and it is now proposed to con-

*Lode tin mining largely in Walsh and Tinaro field, where 14 plants were in operation at close of last year. Alluvial mining handicapped by scarcity of water.*

*Effect of low prices on production. Drainage of deep mines. Milling practice. Sluicing and dredging. Improved transportation. Government assistance given to miners.*

nect the mine by tramway with the Louden mill, which will be enlarged to meet the greater claims upon its capacity. The Governor Norman from casual crushing produced 50 tons of black tin, and may be expected to do better during the current year. The Ibis weir—a pile of concrete over 63 ft. in height—conserves a splendid supply of excellent water, which is now laid on to Irvinebank.

On the same spur of the Dividing range as the Governor Norman, but at a higher elevation, the Endeavor & Leslie mine during the earlier months of the year maintained a respectable output, but lately the ore body appears to have cut out, and the owners have transferred their attention to their recently acquired Captain mine on the Dry river, where they are opening a small vein of high-grade ore.

At the Junna, development which, during the late period of high prices, has been entirely subordinated to the extraction of ore, is again about to be resumed, and the shaft is now being sunk deeper.

The Go-Ahead Co. is now treating ore from its Jester Surprise, and other leases at its newly erected works, and, under capable and experienced management, has fair prospects of success.

The Vulcan Hope Co., with some assistance from the government, purposes erecting a plant to treat the large body of ore opened up in its Mount Agnes lease. The Norman, Caletta, Consolidated, Mount Peterson, Adventure, and many others convey their crushings with more or less regularity to the Irvinebank, Bischoff, and Star mills, and will continue to contribute to the district's output of tin.

The Smith's Creek Proprietary mine, of Nymblood, although hampered by vexatious delays from defective machinery, yielded 350 tons of black tin in 1907—an output that closely approaches, and in value greatly surpasses, that of the Vulcan, thus fairly vindicating its claim to rank as the second largest producer of the year. Horizontal development between the 100 and the 300-ft. levels has proved the lode to be 130 ft. long by 30 ft. wide, carrying 2.6% of pure mineral, and there is good reason for believing that the additional 100 ft. of sinking now contemplated will disclose further pay-

able deposits. A mile north-easterly from Nymblood, Hall's mine is developing its deeper level, with promising results, and a rich vein of tin oxide in quartz is being opened up by the Nymblood Queen.

Foremost of the many mines in the still imperfectly explored territory, which forms watershed of California, Reid's, and Emu creeks, are those of the Gilmore group which, last year, under disadvantageous conditions of equipment and transport, produced nearly 300 tons of tin concentrates, representing nearly 15% of the ore treated. The deepest workings are down 200 ft., and sufficient ore has been exposed to warrant the expectation that the past rate of production will be maintained during the current year.

Among other contributors to the recently erected Gurrumbul mill were Dalziel's, with more than 100 tons of black tin, partly derived from the outcrop; the Adelaide, with 60 tons obtained from 6,000 tons of ore—a result of 1%, but said to be payable; the Right Bower, with 30 tons, being 19% of the output; the Village Blacksmith, noted for its rich though somewhat narrow veins; and the Elsie, whose 23 tons of tin from 64 tons of ore had again established a record yield for the quantity of ore treated, when unfortunately the vein was completely cut off—a fate that has also befallen the Rose of Tralee, whose performance in 1906 seemed to promise a prosperous future.

The Gurrumbul mill, while an unquestionable boon, cannot advantageously serve the more distant mines of the district. It is probable, therefore, that while the mines on the upper watershed of Reid's creek will continue to send ore to Gurrumbul, those from the Village Blacksmith eastward to Enniford will give their custom to the new mill now being erected, with some assistance from the government, by the Emu Creek Tin Mining & Milling Co., and so effect a considerable saving in the cost of transportation.

In the immediate vicinity of Herberton mining has been more active and prospects are brighter than for many years past. The improved position of the Great Northern Freehold is due to the reopening of old surface workings. Close by the southern boundary of the freehold, in a shaft sunk in an abandoned quarry known as the "Frog-hole," is now being followed a body of high-grade tin ore that has helped to substantially augment the latterly very moderate output of the mine. Small quantities of ore are also being won from various levels in the main shaft, but no development of importance in the deep ground has been announced during the year.

The Good Friday, from an ore body persisting from near the surface to a depth of 80 ft., has, during 1907, crushed 227 tons of ore for a return of 25 tons of high-grade tin, and has now at grass some 60 or 70 tons of similar ore. The Adelaide Syndicate, which owns the Brad-

\*Extract from Queensland government report for 1907.

lough, and Wild Irishman, has hoisted occasional parcels of good ore, but more comprehensive methods of mining are wanted to make the mines payable. The drainage, by means of a tunnel, of the old shaft of the Phoenix mine, near the Great Northern, has revealed a fairly extensive quartz lode carrying payable tin; and the Black King, St. Patrick, Ironclad, Easter Monday, Anti-Socialist, and about a dozen other mines on the Herberton hill have helped to swell the output.

None of the Watsonville mines has produced any considerable quantity of tin during 1907, although the aggregate output from that center is respectable. The extension of the "T" tunnel in the Cuprite mine, and the driving of a new tunnel more than 400 ft. through intensely hard country in search of the King of the Ranges lode, represent the prospecting work of the year.

At Bakerville the New Era, hitherto an object of interest as an instance of the successful treatment of extremely low-grade ore, has at length succumbed to a falling market, and possibly in some degree to a change of management at a critical period. From January to December last 6,697 tons of ore were treated for 37 tons of tin, or 0.85%—an unpayable result at present prices. Barely a mile distant, and in similar country, the tributaries of the Bakerville mine, from a body of considerable extent, are producing ore of payable quality.

The failure of the old Coolgarra Co. still overshadows that portion of the district, and want of capital precludes systematic development. Internatennat crushings from the Albama, Dolocoth, Grant, Stapleton and Barrett, St. Patrick, Excelsior, and many others have contrived to keep 10 head of the local battery supplied during the greater part of the year.

At Koorboora, both the older mines and those more recently discovered have fairly responded to the calls made upon them; and, as the ore bodies have an appearance of considerable permanency, a satisfactory return from this center may be looked for during the current year. Dissatisfaction has been expressed by some of the mine owners of the district with the results obtained from the Koorboora mill, but inquiry goes to show that any disappointment experienced is due less to defective treatment than to over sanguine estimates of the tin contents of the stone. Tin mining in the Dry river valley is at a lower ebb than for some years past. Frequent changes of management have adversely influenced the fortunes of the Lancelot Co., and have retarded any continuous system of prospecting. The diamond drilling plant sent from Germany has proved quite inadequate, and the little work done by it has been costly and fruitless. The Lancelot mine during the first half of 1907 yielded 20 tons of concentrates, but during the latter half was entirely unproductive, since exploratory work had failed to expose any payable ore. Nor have much better results attended operations at the Magnam Bonum and other mines of the company, who have now to face the unpleasant consequences of want of foresight in neglect-

ing to keep development work in advance of ore winning. The Hadleigh Castle, owned by a local syndicate, after a period of repose, was unwatered in June, 1907, and has since then furnished a few tons of tin, but the veins are usually small and disjointed, and occur in very hard granite.

A 3-head battery, driven by an old engine, has been erected to treat a small lode in the neighborhood of Fossilbrook. The occurrence of angular tin bearing ore seems to point to the existence of other lodes in the district, and the approach of the Almaden-Etheridge railway will no doubt stimulate prospecting in this part of the field.

At the close of the year there were in the Walsh and Tinaroo field 14 plants for the treatment of lode tin, with a total reducing power of 172 stamps, three Huntington mills, two sets of Cornish rolls, and 15 rock breakers. Only 10 of the 20 stamps of the Coolgarra mill were in use during the year, and the New Era mill (10 stamps), and Lancelot mill (five stamps) were closed during the latter part of 1907 while the 10-stamp mill commenced three years ago at the Lancelot still remains uncompleted. A new mill is in course of erection at Lower Reid's creek, and another is projected in the neighborhood of Irvinbank.

An active demand for labor for railway and tramway construction, coincident with a prolonged period of dry weather, has served to considerably reduce the number of men who commonly follow the pursuit of alluvial tin mining, and no fresh find of alluvial tin fitted to engage the attention of the individual miner has been announced during the year.

Considerable advance has, however, been made in the more ambitious alluvial propositions, where machinery has been called in to cope with conditions too onerous for ordinary methods. The first of these ventures, which commenced operations on the upper portion of the Herberton lead in 1906, has proved a failure, and the promoter, the Wild River Tin Mining Co., has abandoned its ground and removed the machinery.

The Herberton Tin Mining Co., three miles farther down the lead, has by a careful system of boring, been very successfully proving the extension of the tin bearing drift at depths approaching 150 ft. Shafts, sunk at judicious intervals, are connected by drives through highly payable wash, and small winding plants have been erected in readiness for the removal of the pay dirt when the connections are completed; while in advance the Keystone drill is engaged in following the course of the lead and fixing the site of future operations. The company should add to the production of the current year.

Of the superficial low-grade alluvial tin deposits of the field, perhaps the most prominent is the Mount Garnet Hydraulic Co.'s mine at Glutton Gully, where the water from Mount Garnet dam forced by a centrifugal pump through a giant nozzle, breaks down the ground, while by means of another pump the pay material is elevated to tin saving sluice boxes. Near the confluence of the Dry river and

Woolooman creek, the New Dorothy and Woolooman Creek companies are engaged, the former breaking and concentrating tin bearing gravel, occurring on a hillside; the latter in hauling wash-dirt from river and creek beds for treatment in a revolving screen—in both instances hampered by want of water.

About 20 miles west from Port Douglas, at an elevation of 4,000 ft. above sea level, the Mount Spurgeon Alluvial Tin Mining Co. has temporarily suspended sluicing operations, and is now engaged in lowering its tailrace, so as to allow the deeper ground in Sandy creek to be worked.

The find of alluvial tin under basalt about a mile below the junction of the Wild and Dry rivers has been worked with payable results, but the ground is wet, and, as yet, no person has ventured to explore the many miles silt lower down along the edge of the basalt on the left bank of the Wild river. While, from causes already mentioned, the yield of alluvial tin recovered by ordinary methods is likely to diminish rather than increase, the returns from alluvial companies should augment the output for 1908.

Ewan continues to be the chief center of the Kangaroo hills field, and here the Mount Brown Co., encouraged by the developments in its own properties, and by the support accorded by neighboring mines, is adding to its mining and reducing machinery. While the older mines in this locality have thus been maintaining their output, a new and promising competitor, known as the Mount Kidston, has come forward during 1907, furnishing as a first contribution 400 tons of ore, which yielded 3½% of black tin, amounting to 70% of metal.

Satisfactory crushings have rewarded the tributaries of the Roh Roy and Separation leases, at Waverley; but, although good ore occurs in most of the company's mines, the shoots are so irregular as to discourage systematic development. The very complete 10-stamp battery recently erected at Red hill, 20 miles north-east from Waverley, has treated about 6,000 tons of tin bearing cement, for a return of about 12 bbls. per yd. of gravel. Operations have been greatly retarded by want of water, and it is now proposed to pump water from Pineapple creek, with the view of concentrating the gravel before subjecting it to battery treatment, although it is possible that eventually the battery process may be discarded in favor of some system of hydraulic sluicing.

*U. S. Trade with Germany.*—During the 11 months from June 1, 1907, to May 31, 1908, Germany imported from the United States: Coal, 8,957 tons valued at \$28,473; copper ore and matte, 35 tons, \$9,000; copper, ingots, etc., 122,480, 362 lbs., \$18,149.03; electrical appliances, \$187,629; other instruments for scientific purposes, \$265,524; electrical machinery, \$93,288; metal working machinery, \$1,875,426; pipes and fittings, \$42,340; illuminating oil, 134,044,354 gals., \$6,921,340; lubricating and heavy paraffine, 21,219,187 gals., \$2,751,474; paraffine and paraffine wax, \$7,066,192 lbs., and \$348,080.

# The Application of Chlorine in Metallurgy.

By CHAS. E. BAKER.\*

*Metallurgist.*

The usual method of treating sulphide ores is to use the sulphur as a fuel, as in pyritic smelting, or by its combustion in roasting to oxidize it; either of these processes destroys it. The methods for putting gold into solution, either by cyaniding or wet chlorination, require ore that has been oxidized, either by roasting or by the natural action of the elements. In either case, the oxidation is imperfect, and the extraction of the gold only partial.

The most plentiful and cheapest element that will produce base metal solutions is chlorine. Found in common salt, it is available almost everywhere. Improvements in electrical devices and in the knowledge of electrolysis have now made the decomposition of salt by electrolysis commercially successful. The cost of chlorine is more than offset by the value of caustic soda, obtained simultaneously with its production. Therefore, working thus, chlorine costs nothing.

The process I have been developing for about five years, uses chlorine so obtained, and is intended for the extraction of metals from refractory ores described here as sulphides, although applicable to arsenides, tellurides, etc., with unimportant alterations in the application of the chlorine and mechanical handling.

The finely pulverized, practically dry ore is placed in the porcelain lined mill, commonly known as the tube mill, provided with lead-lined trunnions and flint pebbles. It will be referred to hereafter as the drum. We know of no other means for completing decomposition, especially in handling zinc sulphides.

The chemical action generates so much heat that the chloride formed becomes melted, or volatilized, and spreading to surrounding particles, covers them over as by a varnish, preventing further action by chlorine. As the drum revolves, the flint pebbles grind the particles, preventing continuously fresh surfaces to be acted on. They also tend to break up or prevent any clodding or balling of the mass. The gas is admitted to the drum, and acts at once on the ore. The metal combines with the chlorine, liberating the sulphur.

As the chemical attraction of chlorine for metal is greater than it is for sulphur, sulphur chloride is only formed as the metal contents decrease. The drum revolves during the operation, and chlorination of the metals is effected, leaving sulphur free with the gangue, provided no heat is applied, and the supply of chlorine stopped when the metal is chloridized. But if the drum be heated, sulphur chloride is formed, and at about 150 degs. C. is expelled as a gas, and may be condensed. It makes a byproduct of much more value than sulphur, being salable at 10 cents per lb. Arrangements can be made to take care of extra and escaping chlorine by having two drums

*An economical chemical method of treating gold and other ores. Sources of chlorine. Recovery of copper and zinc from pyrite cinder by employing the chlorination process. Treatment of garnierite in New Caledonia.*

*Prospects for a profitable by-product industry. The Swinburne-Ashcroft chlorine method.*

in tandem, or by passing it into a bleach chamber.

The process proper ends here. We have the chlorides, and the sulphur has been eliminated from its combination, and made available for revenue. But while the process, so far as the patents extend, has ended with the work of decomposition, it is not all of it. The recovery of the chlorine for use again is a necessary part, as is also that of the recovery of the metal. If the process be illustrated as applied to a lead-zinc sulphide ore, carrying gold and silver, the contents of the drum after chlorination would be emptied into leaching tanks, the soluble chlorides removed, leaving behind in the gangue with the free gold any insoluble silver or lead chlorides remaining. In the presence of plenty of other chlorides they are both partly soluble, and in most cases they will be carried forward with the other solutions.

During chlorination, the iron forms ferrous chloride, and gold will not become soluble in its presence, nor when chlorine is dry. The gangue, freed from all base metals and containing the free gold, is in fine condition for gold extraction, much better than if from a roasted ore. It may be recovered by wet chlorination, by cyaniding, or by amalgamation in barrels. It will be too fine for plate amalgamation. Silver may be recovered by leaching with sodium hyposulphite.

Purification of solution follows. Granulated lead precipitates copper. Granulated zinc precipitates lead. The remaining solution would then contain ferrous and zinc chlorides. Chlorine must be supplied to make the iron ferric chloride, then zinc oxide precipitates ferric hydroxide, forming zinc chloride. Electrolysis then produces practically pure zinc, and the chlorine is liberated for use again.

Suppose the ore handled be one whose principal ingredient is copper. It chloridizes as cuprous and cupric salt, either or both. If it should be cuprous, it is then only partially soluble. Then it is readily soluble in other chlorides, especially of sodium or calcium. Electrolysis then produces copper, liberating chlorine, the iron chloride remaining undecomposed, at the low voltage used in copper electrolysis. No deposit of copper takes place until the cathode department becomes cuprous.

In a large plant in Germany where a

pyrite cinder is being handled, the chloride solution contains copper, iron and zinc. Copper and zinc are being produced from the same solution on a large scale, each practically pure. Last year's zinc output averaged about 2½ cents per lb. above the market price for spelter, owing to its purity.

The Swinburne-Ashcroft method of handling ores by chlorine under pressure produces, by chemical action alone, a temperature of from 600 to 700 degs. C., but is limited in its application to ore carrying not over about 30% gangue; that is, to concentrated material. The difference between their system and this is apparent. Much gangue would block them off mechanically, while we prefer having the gangue to keep down the temperature, to avoid volatilizing the chlorides. In their case sulphur vaporizes. I do not refer to their process for the purpose of criticism. I only wish to call attention to the differences and to show that the wasteful, expensive system of concentration is neither necessary nor desirable for ours.

The concentration of ore should be only for the purpose of saving transportation expenses, as losses by concentration are very heavy. This subject is worth attention. Cut out smelting, roasting and concentration, and replace them with chemical and electrochemical methods. Chlorine is the element for the work, either as such or as the active element of hydrochloric acid or other chlorides.

Here is an illustration of an application of chlorine in the form of hydrochloric acid as the chloridizing agent. The silicate of nickel-aluminum-magnesium-iron, forming the garnierite ore found in New Caledonia, presents an almost impossible smelting proposition, as the main ingredient is magnesia. It can readily be handled by hydrochloric acid, and, after chloridizing, the acid is recovered from the base metal chlorides by calcination and used again, the nickel only retaining chlorine. We worked this process out to apply on a similar ore, found in North Carolina, and it will also apply to another deposit in Oregon.

The calcination of the chloridized silicate drives off the hydrochloric acid, and at the same time renders the gangue granular and readily leachable. Here is an application of chemistry to an ore carrying only about 14½% nickel with 15 to 25% magnesia. Smelting such would be impossible, yet the expense was light, because the consumption of hydrochloric acid was, in the end, limited almost to the requirement of the nickel for its chloride.

From the nickel chloride so formed we produced metallic nickel electrolytically, recovering the chlorine. No smelting at any stage.

Other uses will be found for chlorine in metallurgy. By its use it should be possible to build up a byproduct industry in the mining business similar in its ef-

\*Abstract of paper read before Am. Electrochem. Soc., Oct. 18, 1907.



fect to that of the byproducts of the petroleum business.

At one time we treated a copper sulphide ore carrying 29% copper, and recovered bismuth, having a greater value than the copper, even in so rich an ore. Which is then the byproduct? Modification of the process will take place, of course. Methods for handling solutions in leaching and purification will be improved on. Some of the pressure or vacuum filter apparatus may be found useful. Some may seek methods for chloridizing which evade our patents, and then will claim originality themselves. We expect that—in fact, we already have such a case.

The field is a new one; we have touched only on the main points—much is to be learned. The cells to be used for all the work must be so constructed as to save the chlorine, and therefore must be supplied with diaphragms, and have the anode compartment hooded. There are various cells in commercial use, electrolyzing salt, almost any of which may be used, but for metal recovery the cells should be arranged so that the cathodes will receive the deposit on each side, having one more anode than cathode. The connections are parallel in each vat, the vats connected in series, the sizes made to fit the current used.

In handling ore for copper recovery from chloride solutions the voltage is much greater than it is in the refining from soluble anodes in sulphate solutions. Therefore it would at first glance appear to be prohibitive. But the excess energy is partially offset by the double rate of copper deposition.

I believe that copper can be produced from ores this way much cheaper than by the old method of concentration, matte smelting, Bessemerizing to Mispickite, casting into anodes and sulphate refining by electrolysis, with its subsequent handling of the gold and silver and other electrolytic slimes. All these extra steps are eliminated by this method.

The chlorine method would prevent the danger of carrying arsenic and antimony in the copper, because they would not follow into the solution, but would pass out with the sulphur chloride instead. In my opinion, the solution method is preferable to fusion in handling zinc chlorides. They are easier handled, avoiding the difficulty in drying and fusing. We have obtained solid iron from ferrous solutions. As the general run of ore carries iron, its value as a byproduct may be worth considering.

In commercial practice, it will be found that 2 kw. hours will produce about 1 lb. of chlorine, zinc, iron or nickel, and about 4 lbs. of copper or lead. In the case of lead, these figures are derived from the electrolysis of the fused chloride, where some of the energy was used to maintain fusion.

The receipts of the British patent office in 1907 totaled £300,389 (\$1,152,890), an increase of nearly 5% as compared with the previous year. American inventors applied for no less than 828 patents in 1907.

## Extracting Uranium and Vanadium.

BY H. FLECK, W. G. HALLINE & E. L. WHITE.

In extracting uranium, vanadium and other values from ores containing the same, we fully utilize the acid solvent employed.

Carnotite often occurs as an impregnation or incrustation in the sandstones or shales of western Colorado and Utah, usually yellow or light brown in color, but sometimes colored blue or green by carbonates of copper.

According to our patent (U. S. No. 890,581, June 9, 1908), we proceed substantially as follows: The ore is crushed, preferably to 20 to 40-mesh, and is then agitated with hot sulphuric acid of 15 to 20% concentration, the proportion of acid used depending upon the quality of the ore. As a rule 400 lbs. of sulphuric acid of 65 degs. Be, diluted to 15 to 20%, will be found sufficient for the treatment of 1 ton of ore.

The resulting acid solution contains the uranium, vanadium and copper values, and is preferably filtered or otherwise clarified. The resulting clear acid solution is then brought into contact with fresh ore, being heated and agitated in contact therewith, whereby the solution is neutralized; at the same time a part of the uranium, vanadium and other values, frequently accompanied by iron, is precipitated upon the ores as basic sulphates or carbonates, the effect of this precipitation being to enrich the ore which may be initially of a low grade.

The neutral solution is again clarified if necessary, and constitutes a portion of the stock solution suitable for further treatment for the separation of the values. The enriched ore which has served for the neutralization of the acid solution, either alone or mixed with fresh ore, is treated with sulphuric acid as above described, yielding an acid solution which after neutralization as above is added to the stock solution.

The ore residues from the treatment with sulphuric acid, as well as the residues from the similar treatment of the enriched ore, are freed from remaining values by washing with dilute sulphuric acid or acidulated water. The resulting acid washings are then strengthened by the addition of sulphuric acid to a preferred concentration of 15 to 20%, and are utilized for the continuance of the process.

The substantially neutral stock solution containing uranium, vanadium and usually copper and iron is then treated with sulphuric acid, usually by subjecting the solution to the action of sulphur dioxide obtained by roasting sulphur or sulphide ores. This effects the reduction of the iron and vanadium compounds present to the ferrous and vanadous states respectively, a corresponding quantity of sulphur dioxide being simultaneously oxidized to sulphur trioxide and combining with the water of the solution to form sulphuric acid.

In thus reducing the iron to the ferrous condition the advantage is secured that in the subsequent precipitation of the uranium and vanadium less iron is precipi-

tated and the values are therefore obtained in more concentrated form.

A further important advantage is that the sulphuric acid derived from the sulphur dioxide is available for the treatment of additional quantities of ore, and may be utilized by adding to the acid solution a quantity of ore just sufficient to neutralize the same while avoiding the precipitation of any values. The residue from the ore employed for neutralization is utilized in the initial state of the process.

The reduced and substantially neutral solution is separated from the ore, clarified if necessary by filtration or decantation, and treated with the calculated quantity of finely pulverized limestone or equivalent carbonate to bring it to the point where uranium, vanadium and copper values would just begin to separate, calcium sulphate being formed.

The solution is now separated from the calcium sulphate, and the values completely precipitated by boiling with the requisite quantity of pulverized limestone. The precipitate, which comprises a complex mixture containing basic sulphates and carbonates of uranium and vanadium, compounds of iron, and hydrated calcium sulphate, is initially green, but changes rapidly in air to light green or yellow. It may be probably shipped, preferably after drying, or drying and igniting to effect a further concentration of the values. Or the values may be further refined or concentrated by any suitable method. For instance, they may be treated wet or dry with sulphurous acid solution, which takes up the values, forming a greenish solution of sulphites. This solution when boiled evolves sulphur dioxide, which may be recovered and again utilized, and precipitates uranium basic sulphite, which may be ignited to uranium oxide. The vanadium remains in solution and may be precipitated, together with some iron, by caustic lime.

Sulphurous acid may be used on some ores for the direct extraction of the values without previous treatment with sulphuric acid. This may be accomplished by passing sulphur dioxide into water covering the ore, the entire mass being heated and agitated, preferably under pressure. The values pass into solution, which is drawn off and if necessary filter-pressed or otherwise clarified. Upon boiling the clear liquor, sulphur dioxide is recovered, and the uranium is precipitated as basic sulphite and subsequently ignited to uranium oxide. The vanadium remains in solution and may be recovered by precipitation by caustic lime as above described.

It will be observed that the method as described involves the complete utilization of the sulphuric acid employed as solvent, as well as of the acid formed in solution with the concurrent reduction of the compounds of iron and vanadium, and that it is therefore very economical as regards consumption of acid. The precipitation and refining of the values are accomplished by the use of inexpensive reagents, and the method as a whole is both economical and efficient.

Phosphate exports from the United States in April were 121,251 tons, valued at \$947,495.

### Oscillating Table for Fine Sands.

BY ERMINIO FERRARIS.\*

For sands below 2 mm. to 0.5 mm. the oscillating table has been in use at the calamine works at Montepini in Sardinia since 1898. This apparatus is well known also in other countries, since the Fried. Krupp Grusonwerk bought the patent and introduced it into almost all mining regions.

The oscillating table is built in two types; one for fine sands below 2 to 0.5 mm., the other for sands of 0.5 down to 0.05 mm. They are identical in principle.

The first type, a rectangular table, is placed horizontally in the direction of the movement, and slightly inclined in the other direction. It rests on six inclined springs, and receives an oscillating motion from an eccentric, exactly like the vibrating screens; the table is covered with Imoleum. Its inclination may be regulated during the progress of the work by wedges placed between the table and the frame, which rests on the springs.

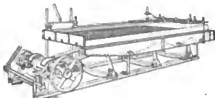
The mixture of water and sand from the hydraulic classifier is distributed by a short longitudinal hopper to the upper angle at the side of the eccentric, while the water flows away transversely. The grains are discharged on the table, running in parabolic lines, according as their specific gravity is greater and their diameter smaller.

The spray pipe placed at the upper side of the table pours out a slender stream of water which holds the grains suspended. Lengthwise grooves depressed in the lin-

parabolic line, as shown in the accompanying illustration.

This table serves also to treat the mixed products from the larger table of the first type, and all the other intermediary fine products. For this work, a screen is used with perforations of 1 mm., corresponding to the maximum diameter of the grains which the table can treat successfully.

The principal data of the large type of oscillating table are: Length, 3.5 m.; width, 1.5 m.; oscillations per minute, 540; amplitude of oscillations, 16 to 18



Oscillating Table for Sands, 2 to 0.5 mm.

mm.; water used per minute, 50 liters; necessary force, 0.75 h. p.; dry weight of material treated per hour, 400 to 600 kgs.

The principal data of the small oscillating table are: Length, 2.25 m.; width, 1.10 to 0.5 m.; oscillations per minute, 550; amplitude of oscillations, 12 to 15 mm.; water used per minute, 10 to 15 liters; necessary force, 0.5 h. p.; dry weight of material treated per hour, 200 to 400 kgs.

### British Tin Trade.

The imports of tin into Great Britain for the five months ending with May were 18,624 long tons, as against 17,555 tons for the same period last year; an increase of 1,069 tons. Of this year's imports the Federated Malay states furnished 15,761 tons, as against 13,854 tons in 1907; Australia, 2,083 tons against 2,305 tons; while the remainder came from various other countries.

Of this year's imports there has been exported 13,886 tons, principally to the United States, which compares with 11,798 tons in 1907; an increase of 2,088 tons.

There has also been imported this year 10,527 tons of tin ores and concentrates, as against 8,884 tons in 1907; an increase of 1,643 tons. Of this year's total, Bolivia supplied 8,612 tons, against 6,642 tons in 1907; the United States, 22 tons against 19 tons; Eastern Canada, 27 tons against 7 tons; Australia, including New Zealand, 64 tons against 41 tons; Africa, 892 tons against 263 tons; Germany and Holland, 326 tons against 797 tons; France, 516 tons against 881 tons; Spain and Portugal, 119 tons against 97 tons; the remainder coming from a number of other countries.

Exports of domestic tin for the five months this year were 3,482 tons against 3,892 tons in 1907; a decrease of 410 tons. Of this year's exports the United States received 365 tons, as against 1,001 tons in 1907; Canada, 253 tons against 250 tons; France, 647 tons against 271 tons; Russia, 358 tons against 481 tons; the remainder going to numerous other countries.

### Bauxite Industry of France.

BY ROBERT P. SKINNER.\*

According to official figures, the quantity of bauxite exported from France in 1907 was 110,915 tons, valued at \$471,113. The declared value of the bauxite exported to the United States from the Marseille district during the years 1905, 1906 and 1907 amounted to \$50,162, \$55,787 and \$108,207, respectively.

The deposits, which were the first to be discovered, continue to be the most important in the world, both in extent and value. The first valuable beds were found in the neighborhood of Les Baux, a few miles to the west of Marseille, which accounts for its name. At present the chief sources of supply are in the department of the Var, a few miles east of Marseille, from which exports are made.

Rich deposits of the mineral have been found in different localities, until now unexplored, and the newly organized companies have eagerly taken up concessions, some of which may or may never be actually exploited. After the exhaustion of deposits of bauxite yielding from 60 to 65% of aluminum, the aluminum industry will have in reserve deposits yielding bauxite containing 45 to 47% of alumina, these latter deposits being practically inexhaustible.

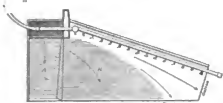
The refractory products manufactured from white bauxite containing from 40 to 45% of alumina are much sought in France for use in industries where exceedingly high temperatures are maintained. Cupolas, locomotive firebox linings, and glass furnaces are manufactured of bauxite bricks, which give special satisfaction. These products are sold at high prices. Practically the total production of white bauxite from the department of Var is shipped to manufacturers of refractory products in Belgium.

The most expensive quality of bauxite is the white ore, which yields 60% of alumina, at most 45% of iron. This ore is utilized in the manufacture of chemicals, and is worth from \$3.57 to \$186 per ton. Next in value comes the red bauxite, containing 60% of alumina and 3% of silica, which is converted into aluminum, and is worth \$2.31 to \$2.80 per ton. Third in order is a special white bauxite for the manufacture of refractory products, containing 45% of alumina, traces of iron, and much silica. These are the broad descriptions of the three standard grades shipped by French producers.

The governor of Shansi, China, reported to the central government that he is preparing to work a petroleum well in Yen-chai-hsien under Japanese supervision. He reports favorably regarding the prospects and has ordered a number of iron barrels to contain the oil.

The Redjang Lebong gold mine in Sumatra is classed as the richest for its size in the world. The monthly crushing is about 5,000 tons of 1-oz. gold ore. The cost of treating the ore is about \$8.75 per ton.

\*American consul general at Marseille, France.



Oscillating Table for Sands Below 0.5 mm.

lenum prevent a too rapid fall of the heavy grains (without stopping the fall of the waste), and force them under the short spray pipes placed at the end opposite to the hopper, where they are divided into groups of different character and specific gravity, and pushed towards the outlet.

The second type, or small oscillating table for sands finer than 0.5 mm., is trapezoidal in form, and has no spray pipe at the outlet; and the hopper at the entrance is replaced by a screen placed a few centimeters above the table, with which it oscillates. The purpose of this screen is to remove the excessively large grains, and to deliver the material evenly. This delivery is made first upon a raised section, A, less inclined than the rest of the table, B, so as to hold the grains, while the accompanying water flows away transversely. The two sections, A and B, carry semicircular grooves, which diminish in depth towards the side of the outlet. The grooved area is limited by a

\*Extracted from *Il-Mon. Italt. A. I. M. E.*, May, 1908.

## Mining & Metallurgical Society of Am.

It has been decided by the council of the Mining and Metallurgical Society of America to issue to the members a monthly bulletin which will record the proceedings. The first bulletin is dated June 1. It is contemplated that the society will enter immediately into five principal fields of activity, as follows:

1. The establishment of local sections, to promote acquaintance among the members, good fellowship, and the interchange of views respecting technical and professional matters.

It is intended that these local sections shall hold frequent meetings, probably once a month, all of the sections to hold their meetings on the same day. It has been suggested that these meetings take the form of a dinner, or smoker, to be followed by conversation and discussion.

Such action as may be taken upon matters of interest will be reported to the general secretary and published in the monthly bulletin of the Society. If in the opinion of the council of the Society any matter be of such general importance as to deserve discussion by all of the sections, they will be requested by the general secretary to take it up. In addition to the meetings of the local sections, there will be in each year at least one meeting of the whole Society.

2. The determination of standards in engineering practice, such as is being done by the Institution of Mining and Metallurgy. The Institution has from time to time appointed committees to consider technical questions as to which there is confusion, with the view to recommending a standard of practice that all members of the Institution are urged to adopt.

Among the questions that have been taken up by the Institution of Mining and Metallurgy are the definition of what constitutes the development of ore, the establishment of a standard of screens for use in screen analysis, and an agreement as to weights and measures commonly employed in mining and metallurgical work. Efforts to secure standardization and uniformity of methods have also been made by other technical societies.

There is a great field for useful work in this direction, and it is considered to be one that the Mining and Metallurgical Society of America may profitably enter.

3. The discussion of questions relating to professional practice and ethics, with a view to the gradual formulation of rules for guidance, determined by the consensus of opinion in the Society. Mining and metallurgical engineers are accustomed to speak of themselves as professional men, but in their actions they often show that they do not seriously regard themselves as such. This may be due to a large extent to vagueness in ideas respecting professional propriety.

Consequently, it is considered that the Mining and Metallurgical Society of America will serve a useful purpose in discussing details of professional practice, such as the relation between the engineer and his clients, the matter of contingent fees, the communications of

gratuitous advice. These are merely a few matters which suggest themselves.

It is considered that a discussion of such questions relating to professional practice and ethics will lead eventually to the establishment of a code of ethics, developing the brief but comprehensive treatise on this subject by Sir Francis Bacon in the preface to his "Maximims of the Law" as follows: "I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto."

4. The discussion of questions of public policy in which the profession of mining engineering is directly concerned. There are many questions arising in connection with the federal and state governments, which have a direct bearing upon the interests of the mining and metallurgical engineer, just as in the case of other professional men.

For example, there has lately been a movement in the state of New York to compel every analytical chemist to secure a license from the state before being permitted legally to practice his profession; similarly it has been suggested that the states should pass laws requiring mining engineers to be licensed. It is no part of the present purpose to discuss or put any weight upon these particular propositions; they are mentioned merely as examples of matters of public policy which come up from time to time, affecting the profession of mining and metallurgical engineering, in connection with which the profession has heretofore had no means of expressing the consensus of its opinion. The Mining and Metallurgical Society of America will be a medium for the expression of such opinions.

5. Finally, it is intended that the Mining and Metallurgical Society of America shall be a strictly professional society, that is, membership in it will be limited to the ranks of the mining and metallurgical engineers, and mining geologists. Serious qualifications are prescribed as a prerequisite to membership, and it is the purpose of the founders of the Society to maintain a high standard of personal character and professional ability among the membership.

In pursuance of this policy, applications for membership will be subjected to rigid investigation in substantially the same way as is done by the American Society of Civil Engineers. It is hoped that this will cause the Mining and Metallurgical Society of America soon to become recognized as representative of the best in the mining and metallurgical profession of North America. Membership in the Society obviously will not be an unqualified endorsement, but it will be a recognition of good standing among and by members of the profession, which in many ways will be useful. It is proposed in the list of members of the Society to print brief records of their professional careers.

The officers for the year 1908 are: President, Henry S. Munroe, New York; first vice-president, Waldemar Lindgren, Washington, D. C.; second vice-president, C. R. Claghorn, Tacoma, Wash;

secretary, J. R. Finlay, New York; treasurer, W. R. Ingalls, New York.

The board of councillors are the following:

Districts 1, 2, 3—New York city: Henry S. Munroe (retires Jan. 1, 1909), J. R. Finlay (Jan. 1, 1910), W. R. Ingalls (Jan. 1, 1911).

District 4—New York and New England: R. H. Richards (retires Jan. 1, 1911).

Districts 5, 6, 7—Pennsylvania and New Jersey: C. B. Dudley (retires Jan. 1, 1909), F. L. Garrison (Jan. 1, 1910), and W. A. Lathrop (Jan. 1, 1911).

District 8—Delaware, Maryland and District of Columbia: Waldemar Lindgren (retires Jan. 1, 1909).

District 9—Michigan, Wisconsin and Minnesota: L. S. Austin (retires Jan. 1, 1911).

District 10—Ohio, Indiana, Illinois, Missouri and Kansas: G. S. Rice (retires Jan. 1, 1909).

District 11—Southern states: Joseph Hyde Pratt (retires Jan. 1, 1910).

District 12—Northwestern states: C. R. Claghorn (retires Jan. 1, 1910).

District 13—Colorado and New Mexico: E. E. Chase (retires Jan. 1, 1911).

Districts 14, 15—Utah, Nevada, California and Arizona: T. A. Rickard (retires Jan. 1, 1909), and S. B. Christy (Jan. 1, 1910).

On June 1, 1908, there were 114 charter members.

## Marble in Greece.

Among the numerous holdings of Mar-mor, Limited, a British company with headquarters in London, owning and working several groups of marble quarries throughout Greece, are the valuable quarries of Tinos island. These quarries, reports the British consul, contain very large deposits of dark green marble with white and violet veining, a most beautiful variety. They are situated close to the sea in the bay of Choussoula, where the blocks of marble are loaded by means of jib cranes into sailing vessels and transported to the Piræus for transshipment abroad.

The extraction of solid blocks of all sizes is possible by means of helicoidal wire saws attached to the rock. Lengths of 20 to 30 ft. are not unusual, while frequently blocks up to 60 ft. are obtained. The installations are modern and extensive, including helicoidal wire sawing plants, driving engines, powerful cranes, railways, piers, houses for the officials and the workmen, stores, etc.

The Tinos green marble is extensively used in Europe for furniture tops, as well as for interior decorative work, while in the United Kingdom and America it is much sought for columns, pilasters, etc., principally for its beauty and solidity. The production in 1907 exceeded 1,000,000 tons, of which 592,587 tons has been exported.

Great Britain imported 4,400,000 carats of diamonds, valued at \$42,908,016, from Cape colony last year. In 1906 the quantity was 3,912,457 carats, valued at \$44,611,558.

# Suggestions for Coal Producers and Consumers.

Wherever gas has been found in a mine safety lamps should be employed exclusively.

The front and center binder irons for mine cars should be strong and heavy to prevent the cars from spreading under the weight of the load. The truck should be rigid in construction to insure satisfactory service of the car.

The full value of slack coal as fuel can be realized by first forming the coal into a coherent mass or briquet, such briquets, when of good quality, being equal to or of greater value than the original lump coal from which the slack was derived.

In mines where a single track is used for cars passing in both directions, traffic should be so systematized that the cars going over the various switches will alternate in direction. When this plan is adopted, an automatic switch can be used to advantage and thus save the expense of a man otherwise necessary to open and close each switch.

"Colliery steelite," a new explosive permitted to be used in British coal mines, consists of chlorate of potash, 7.25 to 75.5%; oxidized resin, 23.5 to 26.5%; castor oil, 0.5 to 1.5%; moisture not more than 1%. The explosive is to be used only when contained in a wrapper of thin waxed paper, to be fired with an ordinary detonator or an electric detonator.

At the annual meeting of the Dominion Iron & Steel Co. it was unanimously decided by the stockholders to reject the offer of settlement made by the Dominion Coal Co. This settlement would have meant the acceptance of \$1,150,000 or \$2,000,000 and if the Dominion Iron & Steel Co. had won in the privy council it would have paid \$1.85 per ton for run-of-mine coal and \$1.50 for slack.

Coke production in Connellsville and lower Connellsville regions in Pennsylvania in the first 26 weeks of this year is estimated at 4,243,000 tons, against 10,755,452 tons during the same period in 1907; a decline of 60%. The estimated revenue shows a greater decline, from \$31,200,000 to \$7,000,000, or over three-fourths. These regions make more than half the country's total coke supply.

To find the diameter of a pump cylinder to raise a given quantity of water per minute (100 ft. of piston speed per minute), divide the number of gallons by 4; then extract the square root, and the product will be the diameter in inches of the pump cylinder. To find the capacity of a cylinder in gallons, multiply the area in inches and divide the result by 231 which will give the capacity in gallons per single stroke.

An excessively high temperature in mine workings tends to lessen the daily output per man and is injurious to the health of the miners. The sudden change from one extreme of temperature to another when the miner comes out of the

*Helpful hints, the result of practice in colliery, coke oven plant and boiler room.*

*Digest of progress in coal mining and coke manufacturing. New installation of machinery and labor saving devices. Prevention of mine accidents.*

workings on a cold winter day, often produces disorders of the respiratory organs, and the inflamed surfaces are likely to collect dust from the air, one cause of chronic miners' consumption.

To avoid accidents, traveling on haulage roads ought to be prohibited while the haulage ropes are in motion, or there should be sufficient space on the roadside. Very often a man has to cross from one side of the haulage road to the other, hence it has been suggested that a space for traveling should be on one side of the road (the same side as the manholes), so that if anything were to happen, the man could easily step into his manhole.

To get the best results from steam hose it is well to use a good many plies and avoid turning the steam into the hose at a higher temperature than is necessary. Usually steam hose will withstand a temperature of 240 degs. F. When the hose is subject to a continuous heat greater than this, the rubber will harden and the hose deteriorate. Under ordinary circumstances the pressure of steam should be below 40 lbs. to keep the temperature of the steam within the above limit.

Coal, in the process of mining, transportation, and handling and on exposure to the weather, is subject to more or less disintegration. This disintegrated coal is usually called "slack" and amounts often to a considerable percentage of the lump coal produced in the mines. If this slack coal is wasted the loss so occasioned ranges from 5 to 50%, or even more, of the total coal mined. It is therefore clear that the utilization of this waste slack coal becomes a serious economic consideration.

Some time ago The Mining World published an editorial on the health of miners, which was widely commented on for the unaccounted with the facts. Now we learn from a press dispatch that President Lewis of the United Mine Workers of America, in the course of an address at the miners' celebration at Canton, Ill., on June 29, said: "One of the two worst enemies of organized labor is organized labor itself because of the tendency of some supporters to criticize the faults of their fellows rather than to commend their virtues, and the other is the abnormal appetite of some members for strong drink, which prevents clear judgment on any question. So far as the mining industry of Illinois is concerned wrongs will be righted only

when men understand what is wrong and bring into action reason supported by intelligence enough to change existing conditions."

To secure satisfactory service on an underground telephone line, good insulation is essential, for the chances of leaks are greater in mines than in ordinary aerial lines. In constructing a line underground it is expedient to choose the route least liable to disturbances from caves or from the removal of timbers. Place the line in an easily accessible heading or entry or traveling way. If the mine is equipped with electric power it is advisable to keep the telephone line as far away from transmission and trolley lines as practicable, and wherever it is necessary to carry telephone wires across power circuits, especial care should be taken to prevent accidental connection.

In a determined effort to secure still greater economy in the use of coal, and, at the same time to reduce the smoke nuisance, the Pennsylvania railroad has instituted a special campaign of education among its engineers and firemen. A general order has just been sent out all over the lines east of Pittsburgh to the effect that "smoke means waste and must be avoided." The company has five assistant road foremen of engines at work in and near Pittsburgh, instructing firemen with a view to reducing the quantity of smoke emitted by engines. The coal bill of the road last year was about \$10,000,000. More efficient handling of coal will result in a saving to the company of \$100,000 annually.

The Delaware, Lackawanna & Western Coal Co., in the anthracite region of Pennsylvania, is completing a unique concrete shaft through water, quicksand and clay. The shaft is 48 ft., 10 ins. long and 14 ft. wide, inside measurement. There are three compartments; one for hoisting the coal, one for an upcast airway, and one for a pump and ladderway. In sinking the shaft a steel shoe 59 ft. 6 ins. long and 28 ft. wide and in the form of an oblong with rounded corners was constructed. It was 30 ins. high and with a fine cutting edge. A 15-ft. pit was dug, and on the bottom, placed perfectly level, this big shoe was set. The molds of wood for the concrete were placed on the upper edge of the shoe and built up to a height of 20 ft. Then excavations were begun with the shoe. As the work progressed the weight of the concrete and the shoe drove the shaft down steadily, the concrete wall being renewed every 5 ft. At a depth of 79 ft. solid rock was encountered. The rock was blasted out to within 2 ft. of the outer edge of the concrete wall and to a depth of 20 ft., and this was filled in with concrete, making a solid wall 7 ft. thick for a depth of 79 ft. and a solid wall 5 ft. thick for 20 ft. The rock excavation is now under way and the shaft will be sunk to 805 ft. and will cost about \$200,000. It is expected that the shaft will tap 12 seams of good coal.

## Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

### MEXICO AND THE FOREIGNER.

The Editor:

Having just received your esteemed journal of June 13, I desire to point out to you an injustice which I am sure you are unconscious of and which you will be only too ready to correct. The injustice I refer to is in your article "Mexico and the Foreigner" wherein you speak of the misguided enthusiasm of the Mexican Chamber of Mines regarding the clause of foreigners holding mining and other properties.

Now I am an active member of the above chamber and an Englishman, representing both British and American capital. I attended all the meetings of the above chamber. I was present at the special meeting (which was so tragically interrupted by an explosion, causing some fearful injuries) which was called to organize a special committee of the said chamber to wait upon Minister Oligaris Molina (responsible for the clause), and make it plain that such a measure would give the *golpe de gracia* (death blow) to Mexican mining interests. The commission did not end at that; the committee was also deputized to wait upon Senor Limantour and urge a stay of the freight charges question. Among the Mexicans most forward in these questions were Lic. Luis Reguina and Lic. Kobles, and among the foreign interests were Mr. Raymond of El Oro and Mr. Simpson of the Victoria mines.

The greatest interests of the republic were well represented, and foreigners and Mexicans alike signed the petition to the before mentioned Minister Molina to strongly repeat that the clause was first and solely fought against by the Chamber of Mines, a conservative and thoroughly representative body of high-class engineers, representing their corporations, companies, capital and private interests, and comprises Mexican, French, American, English and Spaniards. The said committee did the work laid out for it. Minister Molina resigns in the coming winter and the proposed new law has been quietly shelved by President Diaz, in whom we have sufficient confidence to trust to him what concerns the best interests of Mexican and foreign capital, which is its daily bread.

Minister Molina is no doubt a deserving man, but he will best serve the interests of Mexico by returning to his home in Yucatan and overseeing his haciendas in that almost unknown state. For your better understanding of his case I may say he understands farming, but mining is a little beyond him, and his best action in this regard has been the handing in of his resignation. For the rest, the articles which are now appearing in the various papers are only the outcome of late news readers who know that the battle has been fought and won (by those whose affair it was) are only too ready to fight each other regarding

their opinions and supposed knowledge of clauses and articles of the Mexican constitution, which, while it cannot possibly help what has already been done, nevertheless stirs up a good deal of ill feeling among less well-informed Mexicans who never at any time have much use for foreigners, especially the English-speaking ones.

Trusting you will give this some space in your interesting paper, in justice to the chamber, I am, dear sir,

H. F. CROOKSHANKS, M. E.,  
Mexican Chamber of Mines,  
Mexico City, June 17, 1908.

## New Publications.

Publishers are invited to send all books and pamphlets treating of subjects relating to mining, metallurgy, chemistry and kindred industries, to the Review Editor of The Mining World. Whenever possible state selling price of publications.

*Annales des Mines de Belgique* 1908. Bruxelles; H. M. Printer. Pages, 686; illus.

*Peat and Lignite: Their Manufacture and Uses in Europe.* By E. Nyström, Ottawa, Canada, 1908; Department of Mines. Pp. 218; illustrated.

*Fourteenth Biennial Report of the Bureau of Labor Statistics of Illinois.* 1906. Springfield, Ill., 1908; State Printers. Pp. 358.

*Le Passé, le Présent et l'Avenir de la Télégraphie Sans Fil.* By Emile Guarnieri. Paris, France; H. Dunod & E. Pinat. Pages, 196; illus. Price, in Chicago, \$1.40.

*Illinois State Geological Survey. Bulletin No. 4. Year-Book for 1906.* H. Foster Bain, director. Urbana, Ill.; University of Illinois. Pages, 260; illus.

*The Gold Placers of Parts of Seward Peninsula, Alaska, including the Nome, Council, Kongorok, Port Clarence, and Goodhope Provinces.* By Arthur J. Collier, Frank L. Hess, Philip S. Smith, and Alfred H. Brooks. Washington, D. C., 1908; Government Printing Office. Pp. 343+; with maps and illustrations.

*Physical Geography of the Esanation-Huakang Region.* By Wallace W. Atwood and James Walter Goldswaiter. Urbana, Ill., 1908; University of Illinois. Pages, 102; illus.

*Arnold's Map of Raxwilde, Nevada.* Compiled by Ralph R. Arnold. Wall map; linen. For sale by The Mining World, Price, \$5.

This, the first edition, recently issued, shows that the compiler of the map has taken unusual care to mention all the claims that had been surveyed in the Rawhide district up to the last day of his work. The map is neatly drawn and lettered distinctly, and its accuracy can best be testified to by claim owners. The task to enumerate all the mining claims in a district like Rawhide, which has lately experienced an extraordinary boom, has no doubt been great, and to other than a United States deputy mineral surveyor, with the qualifications of Mr. Arnold, would have been almost impossible of satisfactory accomplishment.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects, issued during the week of June 2, can be had by sending 25 cents with the 101st notice and name of patent to The Mining World. Remittances may be made by coin, stamps, or postoffice money order.

WEEK, JUNE 16, 1908.

Refract. Charles F. McKinnon, New York, N. Y. (890,758; filed April 22, 1905. Renewed Sept. 20, 1907.)

Rock Packing for Rock Drills. William L. Smith, Columbus, Ohio, assignor, by mesne assignments, to the Jeffrey Manufacturing Co., a corporation of Ohio. (890,805; filed June 8, 1904.)

Carriage for Roadways. Wilhelm Ellingen, Cologne-Lindenthal, Germany. (890,822; filed Jan. 28, 1908.)

Coal and Ore Washer or Concentrator. William L. Ruffe, Allegheny, Pa. (890,876; filed July 28, 1904.)

Process of Recovering Copper from Copper Bearing Solutions. Louis Ameringer, Coquimbó, Chile. (890,887; filed Nov. 4, 1907.)

Pyrometer. Charles Fery, Paris, France. (890,895; filed April 1, 1907.)

Classifier. James R. Holmes, Santa Monica, Cal. (890,906; filed July 7, 1906.)

Dredge. Charles J. Jacobs, Chicago, Ill., assignor to F. C. Austin Drilling & Excavator Co., Chicago, Ill. (890,909; filed June 28, 1907.)

Amalgam Press. Antihime J. Leveque, Leend, S. D. (890,913; filed June 4, 1907.)

Gas Producer. George Westinghouse, Pittsburg, Pa., assignor to Westinghouse Machine Co., a corporation of Pennsylvania. (890,941; filed Dec. 29, 1905.)

Excavating and Loading Device. Emerson F. Baldwin, San Francisco, Cal. (890,954; filed Sept. 12, 1907.)

Pneumatic Drill. Martin Hardcock, Ottumwa, Ia. (890,978; filed April 12, 1907.)

Filter. Edward M. Knight, San Francisco, Cal. (890,980; filed Jan. 21, 1908.)

Filter. Patrick J. Donovan, Grass Valley, Cal. (891,048; filed June 17, 1907.)

Deep Well Packer. Charles M. Heeter, Butler, Pa. (891,065; filed June 17, 1907.)

Method of Producing Sulphur Dioxide of Commerciality. Uniform Temperature and Concentration. John L. Tuttle, Boston, Mass. (891,115; filed Dec. 29, 1907.)

Apparatus for Treating Gases Containing Sulphur Dioxide. John L. Tuttle, Boston, Mass. (891,116; filed July 29, 1907.)

Method of Recovering Copper from its Ores. Henry M. Wilcox, Chicago, Ill., assignor to Emeralda Copper Precipitating Co., Chicago, Ill. (891,125; filed Dec. 21, 1906. Original No. 790,238, dated May 16, 1905.)

WEEK, JUNE 23, 1908.

Smelting Furnace. Eugen A. A. Gronwall, Ludvika, Sweden. (891,218; filed May 1, 1906.)

Smelting Furnace. William J. Hofmann, Scotland, Pa. (891,256; filed Sept. 12, 1907.)

Device for the Purification of Metals. Charles T. Kinn, Urbana, Ill. (891,267; filed Aug. 7, 1906. Renewed April 22, 1908.)

Process for Purification of Metals. Charles T. Kinn, Urbana, Ill. (891,268; filed Aug. 6, 1907.)

Blue-Print Washing and Drying Machine. Charles F. Pease, Chicago, Ill., assignor to one-half to Williams Brown Earle, Philadelphia, Pa. (891,286; filed Dec. 5, 1904.)

Gas Producer. Samuel W. Rushmore, Plainfield, N. J. (891,292; filed May 19, 1906.)

Ore Roasting Furnace. William H. Smyth, Berkeley, Cal. (891,309; filed Oct. 28, 1902.)

Concrete Chimney. Black, John W. White, Spokane, Wash. (891,312; filed Aug. 5, 1907.)

Concrete Block. John W. White, Spokane, Wash. (891,312; filed Dec. 19, 1907.)

Blasting Powder. Harvey D. Purkin and Austin G. Jex, Weinside, Alberta, Canada. (891,334; filed Dec. 10, 1906.)

Concrete Mixer. Samuel Krieger, Philadelphia, Pa. (891,346; filed March 7, 1908.)

Filter Press. Edwin M. Bassler, Chicago, Ill. (891,392; filed April 26, 1907.)

# Current Literature on Mining, Metallurgy, Etc.

*The Manufacture of Sodium Nitrite.* Gilbert T. Morgan. Sodium nitrite is practically the only salt of nitrous acid which is prepared on a manufacturing scale, and it finds extensive use in the production of several classes of artificial coloring matters and also in the preparation of various pharmaceutical products and other fine chemicals.—*Jl. Soc. of Chem. Ind.*, May 30, 1908; pp. 2. 60 cents.

*Round Mountain, Nevada.* George A. Packard. The camp of Round Mountain is situated on the east side of Big Smoky valley, two miles south of Jefferson canyon, and four miles from the site of the old camp of Jefferson, which was a prominent silver producer over 30 years ago. The writer describes the geology and recent developments in mining and milling.—*M. & S. P.*, June 13, 1908; pp. 21/6; illus. 20 cents.

*Developments in the Ely District of Nevada.* Leroy A. Palmer. Describes the geology, method of mining and equipment of the Guggenheim properties.—*The Mining World*, June 20, 1908; pp. 4%; illus.

*A Practical Haulage Plant.* R. J. Hughes. The advantages claimed for the method described are: (1) A regular and constant supply of tubs is kept up at pit bottom, owing to tubs being attached at regular intervals on the rope. (2) The rope traveling at a low speed from two to three miles per hour greatly reduces risk of breakages. (3) On inclined roadways the load on the engines is counterbalanced in some degree by full ones descending and greatly assists in helping the engine to counteract the other varying loads due to different gradients. (4) Weight of rope is carried on top of the tubs, by this means the rubbing of the rope on floor is avoided, the friction is reduced and life of rope is thus lengthened. The cost of operation is low.—*Mg. Engrg.*, June, 1908; pp. 1½; illus. 20 cents.

*The Chemist's Relation to the Copper and Brass Industries.* Ernest A. Lewis. Chemical Analysis is of the greatest importance in the proper selection of metals for various purposes of the copper and brass trade. The writer describes the work of the chemist and the advantages to be derived from employing him.—*Jl. Soc. of Chem. Ind.*, May 30, 1908; pp. 3½. 60 cents.

*Rescue Appliances: Lessons from Glencoe.* H. Kestner. Reviews the conditions necessary for a serviceable respirator.—*Jl. Chem., Met. & Mg. Soc. of S. Af.*, April, 1908; pp. 7½; illus. 60 cents.

*Methods of Protecting Iron and Steel Against Corrosion.* Geo. B. Heckel. Suggests the use of zinc oxide and other mineral substances as a protection against rust.—*Jl. Franklin Inst.*, June, 1908; pp. 15; illus. 80 cents.

*Modern Recrystallizing Smelting of Copper Ore.* C. Offerhaus. This is the first article of the series, which will treat of the application of the recrystallizing

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

In ordering, give date of *The Mining World* in which the article has been mentioned. All orders are payable in advance.

furnace to the reduction of copper ores.—*E. & M. J.*, June 13, 1908; pp. 4½; illus. 20 cents.

*Engineering Practice as Applied to the Fueling Equipment of Power Houses.* Harry P. Cochrane. The type of machinery and method of handling depend upon—the size of plant; kind and size of coal; rate or capacity at which coal is to be handled; location of the delivery point; whether reserve storage, and how much. There are other factors which are considered in detail by the writer.—*Jl. Franklin Inst.*, June, 1908; pp. 25; illus. 60 cents.

*Laboratory Tests on the Use of Coarse and Fine Lime for Cyaniding.* W. J. Sharwood. The object of these experiments was to ascertain the relative rapidity with which commercial lime, in varying states of division, would be dissolved when distributed through a charge of inert sand subjected to the action of percolating water or cyanide solution—the proportions of water, sand, and liquid being practically the same as prevail in the leaching of tailings at the cyanide plants of the Homestake mine.—*Jl. Chem., Met. & Mg. Soc. of S. Af.*, April, 1908; pp. 4½; illus. 60 cents.

*Recent Work on the Comstock.* Walter D. O'Brien. Describes the modern method of unwatering the lower levels of the Comstock lode, and gives costs.—*M. & S. P.*, June 13, 1908; pp. 2½; illus. 20 cents.

*The Brown Iron Ores of Alabama.* William B. Phillips. This is the second article; it gives the production of iron ore and pig iron in Alabama.—*Iron Age*, June 11, 1908; pp. 1½. 20 cents.

*The Techniques of Coal Mining.* George H. Winstanley. Considers the general practical questions relative to the installation of electrical plant in collieries, particularly 3-phase plant.—*Mg. Engrg.*, June, 1908; pp. 3; illus. 20 cents.

*Mining and Transportation in Guatemala.* Clarence C. Sample. Considers the problems of labor, government, geology, etc.—*E. & M. J.*, June 15, 1908; pp. 1½. 20 cents.

*Mining in the Boundary District of British Columbia.* Frederick Keffer. Describes the mineral resources, methods of mining, and gives costs.—*Proc. Inst. of M. E.*, June 4-5, 1908. 80 cents.

*Mineral Resources of Trinidad.* John Cadman. Describes the occurrence of iron ores, graphite, limestone, coal, man-

jack, asphalt, and petroleum.—*Proc. Inst. of M. E.*, June 4-5, 1908. 80 cents.

*Calcing Kilns.* Greville Jones. Reviews the progress made in calcing iron ores.—*Proc. Inst. of M. E.*, June 4-5, 1908. 80 cents.

*Electric Power: Its Generation and Use in Clay Plants.* J. A. Seville. Describes the system of electric motor drive for clay working, and how to select the equipment for such a plant.—*Iowa Engr.*, May, 1908; pp. 6. 60 cents.

*The Final Stages of Tin and Wolfram Dressing.* S. L. Ferrill. As nearly all ores contain pyrites, the first process necessary is calcination. Describes the method of concentration, treatment of fines after calcination, etc.—*London Mg. Jl.*, June 13, 1908; pp. 11-6; illus. 40 cents.

*Colorado Fuel & Iron Co's Plant at Minneca, Colorado.* Geo. J. Bancroft. This is the first article of the series on the history and development of the Colorado Fuel & Iron Co.—*Mg. Sci.*, June 18, 1908; pp. 2½; illus. 20 cents.

*The Analysis of a Small Meteorite Found Near Lafayette, Colo.* Roy M. Butters. The results of analyses were: Nickel, 59.30 to 59.49%; iron, 26.68 to 26.51%; phosphorus, 8.29 to 8.23%; silica, 3.02 to 3.16%; manganese, 0.69 to 0.74%; magnesium, 0.19 to 0.17%; sulphur, trace; calcium, trace; total, 98.23 to 98.30%.—*West. Chem. & Met.*, June, 1908; pp. 3. 75 cents.

*Copper for Manufacturing Brass.* Ernest A. Lewis. Gives analyses of commercial brands of copper to suggest the kind that is better adapted to making brass.—*Proc. Soc. Chem. Ind.*; abstract in *The Mining World*, June 27, 1908; 560 words.

*Gold Mining in California.* Jos. C. Erman. Gives the gold production of the state from 1848 to 1906, inclusive.—*Mg. Sci.*, June 18, 1908; pp. 1½; illus. 20 cents.

*Electric Pumping, Winding, Air Compressing, etc.* H. J. S. Heather. Suggests the best method of generating electric power, and compares electricity with compressed air and steam.—*Proc. British Inst. Mg. & Met.*; abstract in *The Mining World*, June 27, 1908; pp. 1½.

*Development of San Pedro Mountain.* N. M. Robert B. Brinsmade. Describes the history of the district, its ore deposits, and methods of producing gold and copper.—*The Mining World*, June 27, 1908; pp. 3½; illus.

*Contributions to the Volumetric Estimation of Cobalt.* Charles Darwin Test. The results of the experiments reviewed by the writer showed that a practically complete precipitation of the cobalt can be made within an hour and a very fair separation, in some cases complete, in half an hour, by the volumetric method.—*West. Chem. & Met.*, June, 1908; pp. 7. 75 cents.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### The Kennedy Gyrotory Crusher.

The Kennedy gyrotory crusher, manufactured by Chalmers & Williams, Commercial National Bank building, Chicago, is a recent addition to the company's line of rock crushing machinery.

This machine, in its general design, does not depart radically from the usual crushers of the gyrotory type, as will be seen by reference to Fig. 1. It embodies, however, certain improvements which, it is

The sectional drawing, Fig. 2, conveys a clear idea of the principal parts of the machine. It will be seen that a suspension ring, *a*, is keyed to the upper end of the main shaft *b*, and is supported by an adjusting nut, *c*, screwed into a steel sleeve, *d*, set in the spider. A steel bushing, *e*, caps the suspension ring, and protects it from contact with the thread on the inside of the sleeve. By means of the vertical adjustment afforded by the ad-

this machine. The eccentric is housed in a sleeve, *g*, made to two parts bolted together, and runs in a bath of oil, which is always kept above the working parts. Any sediment that may deposit in the oil chamber is drawn off through a drain plug, *h*, in the bottom of the inclosing casting *i*. The eccentric sleeve is encircled at the top by the hub of the bevel gear *j*, which effectually protects the working parts from dust. As an additional protection against the penetration of dust to these parts a packing ring, *k*, is set above the bevel gear, and an upper packing ring, *l*, and dust plate, *m*, are located under the crushing head, *n*. Especial care has been taken to provide dust-proof housing for all bearings, a feature of importance in rock and ore crushers because of the damaging character of the rock dust to which they are exposed.

The machine is belt driven through the bevel pinion *o* and the countershaft *p*, and is constructed throughout with a view to securing a maximum strength and rigidity; at the same time it is claimed that use of the self-aligning eccentric obviates

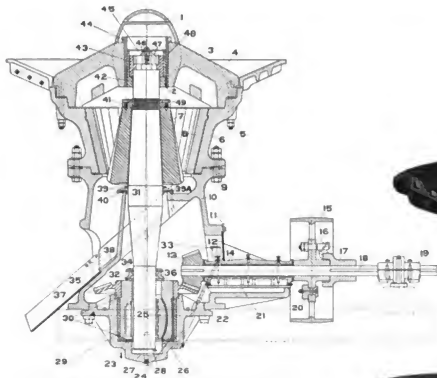


Fig. 2—Sectional View Kennedy Gyrotory Crusher.

claimed, make it one of the most modern and efficient machines of its class.

Of chief importance are the arrangement of the hopper, which permits the removal of the spider, concaves, main shaft or crushing head, without detaching it from the top shell; the high arch of the two spider arms providing ample space for the free passage of rock or ore as it is carried around the hopper; the ball and socket self-aligning eccentric having an unusually large eccentric contact tending to diminish the wear and contributing to uniformity of operation and output, and the keyed fastening provided to connect the main gear with the eccentric sleeve which facilitates the babbitting of the eccentric. The double arm spider is cast in one piece with the ring, which rests on top of the shell and supports the bearing from which the main shaft is suspended. This bearing plays an important part in the gyrotory movement of the shaft because of its unusually wide range of adjustment.

justing nut the fulcrum can be changed to an extent equal to the adjustment of the main shaft, thus effecting a corresponding variation in the inclination of the shaft, for which compensation is provided by the ball and socket eccentric *f*. It is claimed that by this method a greater range of adjustment is secured than is found in other crushers of this type.

Particular stress is laid upon the advantages of the ball and socket eccentric, which is a patented feature peculiar to

undue strains to which it might otherwise be subjected. The driving pulley is equipped with keyed or breaking pin connection, as desired, the former being recommended.

The Kennedy crusher is built in sizes from No. 1 to No. 12, ranging in weight from 6,800 lbs. for the smallest to 360,000 lbs. for the largest, with capacities for crushing 5 to 10 tons and 600 to 1,600 tons per hour respectively, according to fineness of product and other conditions.

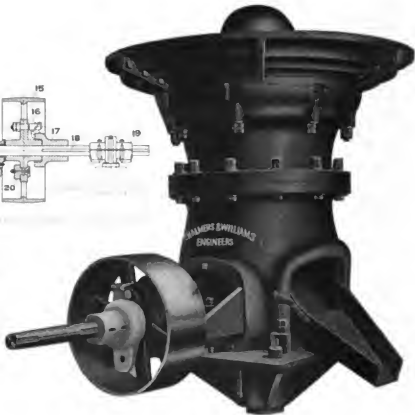


Fig. 1—The Kennedy Gyrotory Crusher.

### Trade Publications.

**Gasoline Engines.** Waterloo Gasoline Engine Co., Waterloo, Iowa. Catalog. Pp. 32; illustrated.

Describes a line of gasoline engines, including stationary and portable types, adapted for various kinds of service. A line of small engines for pumping service is also shown. The catalog also describes and illustrates a line of portable engines, the uses of which are set forth.

**Locomotive Cranes.** Brown Hoisting Machinery Co., Cleveland, Ohio. Catalog. Pp. 39; illustrated.

Is devoted to Brownhoist locomotive grab bucket cranes handling coal, sand, ore, ashes, etc., from stock piles, gondola cars, barges, etc. A partial list of users is appended.

**Melting Furnaces.** Hawley Down Draft Furnace Co., Superior and Townsend streets, Chicago. Catalog; illustrated.

Is devoted to a description and illustration of the Schwartz metal melting and refining furnace, adapted to brass, copper and other metals. Gives numerous views of the furnace, which is of tilting type, using crude oil, fuel oil or gas for fuel. Considerable miscellaneous information is also given regarding the various alloys of copper, zinc and lead.

**Gas and Gasoline Engines.** Angola Engine & Foundry Co., Angola, Ind. Catalog. Pp. 24; illustrated.

Describes the company's line of stationary and portable engines of 2½ to 15 h. p., designed for pumping or other service. A particular feature to which attention is called is an improved timing device, which is designed to retard the spark until the crank is past the inner center, thus compelling the engine to rotate in the desired direction.

**Drawing Materials and Surveying Instruments.** Eugene Dietzen Co., Chicago. Pp. 473; illustrated.

Describes the company's unusually large line of drawing materials and surveying instruments, which includes everything used by surveyors and engineers. The book in addition contains much information of value and is well printed and serviceably bound.

**Steam Specialties.** John Davis Co., 864 South Halsted street, Chicago. Catalog. Pp. 40; illustrated.

Illustrates and describes the company's line of steam specialties, comprising nearly everything in the way of valves, indicators, regulators, governors, separators, etc., used in the power plant. The pamphlet contains a sketch of a power plant showing the application of the company's specialties and the relative position of the appliances. Useful tables are also given.

**Rock Drill.** The Jackson Drill & Mfg. Co., 68 Broad street, New York city. Bulletin No. 18; illustrated.

Is devoted to a description and illustration of the Improved Jackson hand-power rock drill, the operating principle of which remains the same as in the old Jackson drill. With the new drill the very hardest rocks, such as granite, quartz and trap, each can be worked. The drill is operated by a rotary movement of hand crank, which because of the momentum

imparted by small flywheels may be turned slowly and evenly, the operator experiencing no jar or shock whatever. The crank may be attached to either side, thus permitting holes to be drilled close to side walls and in corners and near the top.

**Blowers.** The Connersville Blower Co., Connersville, Ind. Catalog No. 11. Pp. 32 illustrated.

Describes the company's line of smelter blowers, illustrated by drawings and line engravings, showing detail of construction. A number of photographs of special installations are shown, notably one of special heavy duty smelter blowers coupled directly to tandem compound Corliss engines. Valuable data of a series of tests made on these units is also given. In addition views of the company's latest cycloidal pumps are shown. For reference purposes a compilation of facts relative to combustion is also given.

**Expanded Metal.** Northwestern Expanded Metal Co., Old Colony building, Chicago. Booklet; illustrated.

Is devoted to a description and illustration of Northwestern expanded metal, which is a fabric made by cutting staggered slits in sheet steel and spreading it so that diamond-shaped meshes are formed. The expanding process raises the elastic limit and increases the ultimate strength, gives it the most thorough test possible, and makes it a splendid reinforcement for concrete.

### Industrial Notes.

The Metallic Alloys Co. has moved its offices from 98 John street to the new Hudson Terminal building, New York city.

The Archer Iron Works has removed its general offices to 739 First National Bank building, Chicago.

The plant of Flint & Lomax at Denver, Colo., was destroyed by fire last week. The loss is estimated at \$100,000, with \$40,000 insurance.

The Ehret Magnesia Manufacturing Co., Land Title building, Philadelphia, Pa., has established a branch office at 416-418 Fourth street, Milwaukee, Wis., with A. C. Kemper as manager.

The stockholders of the Vulcan Iron Works, Wilkesbarre, Pa., recently elected the following directors: A. H. Van Horn, W. A. Lethrop, E. H. Jones, I. A. Stearns, Thomas H. Atherton, Charles P. Hunt, Richard Sharp, Isaac N. Thomas, E. A. Mulligan, T. F. Ryman and H. Ashley.

The Rockwell Furnace Co., 26 Cortlandt street, New York city, was recently incorporated as engineer and manufacturer of metallurgical furnaces, and fuel oil and gas burning appliances. The officers and employees of the company have been connected for a number of years with the Rockwell Engineering Co., of New York City.

The H. W. Caldwell & Son Co., Seventeenth & Western avenues, Chicago, manufacturers of elevating, conveying, and power transmitting appliances, announces that it has opened a New England engineering sales office, room 317, Oliver

building, 141 Milk street, Boston, Mass. Malcomb R. White, E. M., will be in charge and will devote his attention to engineering propositions, inquiries and orders from the New England states.

The Western Foundry Supply Co., 30 Church street, New York city, announces that it has awarded its selling agency to Rogers, Brown & Co. The company has plants at East St. Louis and at Elizabethtown, N. J., with offices at the former point and in New York city. It is a seller of both ground and lump ferromanganese and ferro-silicon, ferro-chrome, manganese copper and other alloys.

The Mowatt-Quinlan Co. has been incorporated at Houghton, Mich., as manufacturers selling agent for mine and mill supplies, steel, packing, belting, rope, etc. Messrs. Mowatt and Quinlan, the organizers, have been engaged in this field for a number of years, connected with various prominent manufacturing companies and are thoroughly conversant with the business.

The Denver Engineering Works Co., of Denver, Colo., has just opened a district office in the Phelps Dodge building at El Paso, Texas, to take care of its increasing business in that section of the country. The El Paso office will look after its interests in eastern Arizona, New Mexico, and the states of Sonora and Chihuahua, Mexico. L. G. E. Bignell, formerly manager of the Salt Lake district office, is in charge. Carroll Hehnick has succeeded Mr. Bignell at Salt Lake city.

The Blaisdell Co., Los Angeles, Cal., is installing a 150-ton cyanide leaching plant for the Quartzette Mining Co. at Searchlight, Nev. The equipment of the plant embraces five steel tanks, 30 by 6, of 150 tons capacity each, and the mill will be utilized in the treatment of 150,000 tons of tailings. Three 18-in. Robins conveyors will carry the tailings from the pond or pits to a second conveyor provided with Blaisdell automatic distributors. A third conveyor runs beneath the tanks to carry the tailings to the waste dump.

The Pelton Water Wheel Co., San Francisco, Cal., has just shipped a triple wheel impulse unit for direct connection to a 600 kilowatt Westinghouse generator intended for the Kekaha Sugar Co. of Kauai, Hawaii. The generator equipment furnishes power for a number of large motor driven series centrifugal pumps used to elevate water for irrigating the sugar lands of this company. The electrical power is transmitted to three pumping stations, each of which will discharge from one to three millions gallons of water per 24 hours against heads of 200 to 375 ft. The Pelton wheel unit, which is direct connected to an engine type alternator, is equipped with needle nozzles and a very sensitive speed governor; necessary by reason of the fact that the load will fluctuate considerably, especially as the large motors driving the pumps will operate intermittently. Besides the current for their operation, current for lighting purposes is also transmitted, making the governor requirements somewhat severe.



### Personal.

A. H. Taylor of Vancouver, B. C., is in Spokane, Wash.

Samuel W. Traylor of New York city is in New Mexico.

E. V. Neelands, E. M., Toronto, Ont., is in New York city.

C. J. Parker has returned to Chicago from the Pacific coast.

James W. Abbott, F. M., of Pioche, Nev., is in Boston, Mass.

Robert T. Hill has returned to New York city from an extended western trip.

C. T. Stevens has completed an examination of mining properties at Yerington, Nev.

Louis S. Cates, mine manager for the Boston Cons. Mining Co., is on his way to Alaska.

Francis C. Church of New York city is at Goldfield, Nev., examining mining properties.

Charles Raht, sales agent for the Calumet & Hecla Co., has sailed on a vacation trip to Europe.

Frederick V. Irvine of Hill & Irvine, New York city, is in Mexico examining mining properties.

O. B. Perry of New York city, associated with the Guggenheims, is on his way to Alaska.

H. S. Auerbach, manager of the Golden Chest Mining Co., Murray, Idaho, is in New York city.

F. C. Skadan of Chicago, president of the Golden Eagle Mining Co., is at the St. Joseph mineral springs, Michigan.

Edward L. Dufoureaux is on his way to New York city after completing an examination of mining properties in Mexico.

C. F. Spalding, E. M., has returned to Puerto Cortez, Honduras, from Chicago, where he has been for the past three weeks.

N. B. Storer of Chicago, president of the Mexican Union mines, is on a visit to the company's properties in Jalisco, Mexico.

Chas. E. Finney, president of the London-Arizona Copper Co., has returned to Los Angeles, Cal., from an extended eastern trip.

W. J. Partridge, prominent in mining in Australia and the Yukon, arrived at San Francisco last week from Mexico en route to England.

J. A. McCaskell, who has been inspecting mines in Chile, South America, for the past four months, will return to New York city about the first of August.

James P. Evans has been appointed to the position of superintendent of the Colorado Iron Works Co., Denver, Colo., recently made vacant by the death of J. M. Morcom.

S. W. Eccles, vice-president of the American Smelting & Refining Co., is on a visit of inspection to the company's various properties in the west. He will also visit Alaska, where he will look over

the Guggenheim railroad and mining interests.

J. H. McCormick, who had charge of the construction of the new mill at the Skidoo mines, California, has accepted the management of a 200-ton plant at Kendall, Mont.

H. L. Percy, interested with others in the La Magistral and Los Mores copper mines near Ameca, Jalisco, Mexico, has returned to Los Angeles, Cal., from an inspection of the properties.

G. J. Weale has resigned as private secretary to the general superintendent of the Tennessee Coal & Iron Co., to become general superintendent of the Ontario Steel & Iron Works, Toronto, Canada.

Horace F. Evans of Hedley, B. C., is in Oregon making a number of examinations of mines. His post office address for the next six weeks will be Wonder, Ore. Mr. Evans will later make examinations in California and New Mexico.

### Obituary.

William H. Lees, general manager of the Cuarnes Mining Co., Ayutla, Jalisco, Mexico, died suddenly at the property of the company on June 18. He was a prominent member of the American colony of Guadalupe, Mex.

### Technical Schools and Societies.

**Columbia University.**—Professor Arthur L. Walker has been appointed Professor of Metallurgy and Administrative Head of the Department of Metallurgy of the university, effective July 1. He will personally direct instruction in non-ferrous and electro-metallurgy and metallurgical design. Professor Howe will continue to deliver his lectures on iron and steel as heretofore. Since his graduation from the School of Mines of Columbia University, in 1883, Professor Walker has been engaged in metallurgical and mining work for the Old Dominion Copper Co., the Guggenheim properties and others, while more recently he has been a consulting metallurgical engineer.

**Canadian Mining Institute.**—The provisional program for the summer excursion of the institute has been arranged by its secretary, H. Mortimer Lamb, and is as follows:

August 24—Leave Quebec in afternoon.  
August 25—Arrive Sydney, midnight.

August 26—Visit Dominion Iron & Steel Co.'s works and Dominion Coal Co.'s mines.

August 28—Stellarton, 7:20 a. m.  
August 29—Return, via St. John to Sherbrooke.

August 30—Arrive Sherbrooke 5:30 a. m., and leave for Thetford by Quebec Central.

September 1—Leave Sherbrooke by Canadian Pacific railway at 3:30 a. m., arriving in Montreal at noon.

September 2—Leave Montreal for Toronto 10:00 p. m.

September 3—Arrive Toronto 7:00 a. m., leave for Niagara Falls.

September 4—Reception and entertain-

ment of visitors in Toronto by the directors of the Toronto exhibition. Leave Toronto 11:30 p. m. for North Bay.

September 5—Temiskaming & Northern Ontario railroad train for Cobalt.

September 6—Leave Cobalt 5:00 p. m.  
September 7—Arrive Sudbury 12:50 a. m.

September 8—Moose Mountain, Port Arthur.

September 9—Leave Sudbury 5:35 a. m.  
September 10—Arrive Winnipeg 9:50 a. m., leave 11:50.

September 11—Arrive Winnipeg 11:40 a. m., and proceed to Lethbridge by special train. Leave for Frank in the evening.

September 12—Visit Frank and Blairmont.

September 13—Fernie.

September 14—Special train leaving early in the morning for Moyie. Leave 1:55 for Kootenay Landing. Arrive in Nelson 7:15. Arrive Rossland midnight.

September 15—Rossland mines.

September 16—Leave Rossland 8:40 a. m. Arrive Smelter Junction 9:35. Leave Trail 7:20 p. m. Arrive Nelson 10:30 p. m.

September 17—Visit Bonington Falls, etc., and reception at Nelson.

September 18—Leave Nelson 9:45 a. m. Arrive Grand Forks 2:50 p. m. Arrive Greenwood 4:25 p. m.

September 20—Leave Greenwood 3:20 p. m. Arrive West Robson 11:45 p. m.

September 21—Arrive Arrowhead 1:00 p. m. Arrive Revelstoke 2:45 p. m.

September 22—Arrive Vancouver 1:30 p. m. Arrive Victoria 8:30 p. m.

September 23—Meeting Victoria.

September 25—Arrive Vancouver 8:00 a. m. Leave Vancouver 3:15 p. m.

September 26—Arrive Banff 10:00 p. m.

September 27—Leave Banff 10:00 p. m.

October 1—Arrive Montreal 8:25 p. m. Arrive Quebec 3:20 p. m.

### Scientific Instruments in Italy.

A certain quantity of scientific instruments is manufactured in Italy. Those manufactured there are considered to be some of the best in the world of their kind, although there are some special kinds of instruments that Italian manufacturers are unable to conveniently turn out. This special stock is at present imported from the United States, Germany, France, Austria, Switzerland, Belgium, England and other countries.

Instruments have greatly advanced, and a steady increase in the future is predicted. There seems to be a specially promising held for American stock of this kind.

It is not to be inferred that American scientific instruments are not already sold in Italy, but there is room for a great deal more American stock. Scientific instruments play the following important duties:

Manufactures of copper, bronze, brass or steel, fitted with telescopes, microscopes, graduated rods or disks, terrestrial telescopes, monocular microscopes, binoculars, and mounted and unmounted lenses pay \$5.79 per 220 lbs.; without optical parts or graduating rods or disks, \$5.79 per 220 lbs.; all scientific instruments in the construction of which iron predominates, \$5.79 per 220 lbs.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ARIZONA.

**Phoenix.**  
T. H. McGrath, representing Wisconsin mining men, has purchased the Eagle mountain copper mines, on the Gila river, in Pinal county. The new company will develop the property as rapidly as possible. Mr. McGrath also bought the extension of the Sultana National copper mines and a large force of miners will soon be put to work. All the ore is of a good grade and in great abundance.

The Esperanza mine in Mohawk district has its shaft down 138 ft. An assay of the ore from the bottom gave \$4 in gold, 42 ozs. silver, 12 3/4% lead and 1 1/2% copper. Work of sinking the shaft, which is to go down 200 ft., is continuing and all of the ore hoisted is of a good concentrating grade.

Three shifts have been put on the American mine in Patagonia district, Santa Cruz county. A new shaft is down 80 ft., about 100 ft. south of the old shaft. This new shaft is to be sunk 150 ft. from which depth a drift will be run under the old workings and the ore stoped out. The American mine was operated 25 years ago, but to a depth of only 100 ft., and as the ore was mined down, the waste rock and low-grade ore were left in the workings, only the high-grade ore being taken out and shipped.

The National Mining Exploration Co., at Safford, Graham county, is sinking a 100-ft. double-compartment shaft. It is down 450 ft., from this point about 250 ft. of drifts and crosscuts have been run. In the east drift, for 100 ft. in length, ore is exposed that samples from \$5 to \$6 in gold and silver.

The Ray Copper Co., at Ray, Pinal county, has started its mill. In the mine six air drills have been added. The increase of work at the Ray has given a great stimulus to the district. Other companies are making plans for building new plants, and this fall mining will open up on a larger scale than at present.

The shaft on the Two Queens mine at Winkelman is down 285 ft. and a cross-cut is being run at this level to intersect the rich vein recently located. The final shipment of the air compressors, drills and other machinery for tunneling operations has been received and is already very nearly in place. Two shifts will soon be put on for running the tunnel.

The Golden Jewel Dredging Co. in Cherry Creek district, Yavapai county, has received returns on an assay of black sands of \$45 gold to the ton. This company has recently purchased a number of additional mining claims and will install a dredging plant to cost \$75,000.

### Globe.

Much development work is under way at the Old Dominion and work is being carried on on a large scale. The drift on the 10th level is in good ore, consisting of borinite and copper glance, high in both copper and silver. Work has been resumed in the Kirky sulphide vein on the 10th level in United Globe ground,

where good ore is being stoped. The capacity of the main 5-compartment shaft has been increased by equipping two compartments with 3-deck cages and another compartment with a 2-deck cage. Five furnaces were running at the smelter during the greater part of the month, but one was shut down on June 29 for repairs. This will be blown in again as soon as the repairs are made. It is expected that the June output will reach very nearly 4,000,000 lbs.

Development work at the Montgomery mine of the Warrior Copper Co. is making satisfactory progress and much new ore is being opened up. Daily shipments are still being made. The weekly shipments are about 80 tons.

The Gardner shaft of the Superior & Boston is down 200 ft. A station will be cut at this point and sinking continued.

At the Great Eastern the winze has been sunk 40 ft. below the 420 level and is in an 8-ft. body of the finest ore yet encountered. Assays giving 11% copper and from 8 to 11 ozs. of silver to the ton are reported. Forty tons of ore are being shipped daily to the Old Dominion smelter.

The shaft of the Montezuma Copper Co. is now down 175 ft. A crosscut started at the 150-ft. point has been drifted 65 ft., all in low-grade sulphide ore. The ledge is said to be over 200 ft. in width. The property consists of 17 full claims about one mile west of the Miami group.

## CALIFORNIA.

### Auburn.

Another great battle is on in California between the placer mining interests and the anti-debris people. Hydraulic mines are being closed down all over the central counties and their owners fined and imprisoned. In a recent decision the supreme court of California held that a permit granted by the debris commissioners was no safeguard against the assaults of the anti-debris forces. The latest move in the struggle has been the action taken by the supervisors of Sutter county against the dredgers operating around Oroville. It is charged that debris escaping from the gold boats is polluting the streams.

The Cash Rock dredge is rapidly nearing the bedrock. The suction pipe is protected by a triangular shield which also serves as a guard for the divers. The small boulders and sand are sucked up and dropped upon grizzlies through which the sand drops into boxes arranged in tiers and moving in a circle, thus affording time and space to catch the gold. The boulders pass on over the grizzlies to the rear end of the boat over an endless belt and are then dumped into the river. The large boulders are raised with grapple hooks. Two divers working 6 hrs. each are employed.

At the Valley View mine the Taylor

shaft is being unwatered and timbered as rapidly as the water can be lowered. Several powerful pumps are operating day and night. The shaft is 180 ft. deep and as soon as the water is out a large force of men will be employed extending crosscuts from the lower level. Good ore is blocked out in the old workings and the amount of development outlined is expected to place the property on a large producing basis. E. Cartwright is superintendent.

A strong eastern company has bonded the Hilke mine 12 miles northeast of Lincoln and will proceed to operate it on an extensive scale. New machinery will be installed and a large force of men put to work.

W. S. Fletcher is installing a 2-stamp mill at his Home Ticket mine.

### Forest.

The Omega Gold Mining Co. is installing on its holdings of 180 acres in the Picnic grove, two miles west of Forest, a 3-stamp mill for crushing the cemented gravel of which 50,000 tons has been blocked out ready for stoping. It carries an average of \$5 to the ton in free gold. The mill will handle 100 tons in every 24 hours. No plates will be utilized, the crushed conglomerate falling direct into riffled sluice boxes. Manager J. L. Green of Oakland has had a successful experience in the Mother Lode country.

W. A. Lotspeich, formerly of the Black Hills, is reopening the old Ruby through the long tunnel to get at a back channel of auriferous gravel in virgin ground, as well as to tap the extensions of one or more of the Alleghany bonanza ledges.

The Frye & Wilson drift mine, owned by Jason Frye, formerly of Joplin, Mo., and Asa Wilson is turning out high-grade gravel while only exploration work is being done. The gold is coarse, some of the nuggets weighing 10 ozs. This is believed to be a north continuation of the Bald mountain channel by way of the Ruby. Adjoining the Frye & Wilson on the north, is the Mott drift mine, owned by Murdock Morrison and Elmer Mott, who are drifting upon the channel.

At American hill several miles of lavacapped channel carried by the Henness Pass wagon road ridge is being brought under subjugation by long bedrock tunnels, being run by different companies. The acreage farthest east is being developed through the Columbia tunnel run by a company in which San Francisco people are the leading spirits, with J. M. Harper manager. The Forest Mining Co., W. I. Redding of Downville, manager, and Hugh McCormick, superintendent has tapped the gravel in the Mabel Mertz group, and is now running exploration drifts. This company has the extensions of the Emigrant and Nebraska bonanza deposits.

### MISCELLANEOUS CAMPS.

**Mono Lake.**—This district and postoffice is about 20 miles from Bodie. The gen-

eral formation is porphyry, slate and granite. The ledges are from 4 to 8 ft. in width with contact between slate and granite. Some veins are true fissures in the granite. The ore is free milling quartz with about \$10 values in gold to the ton. J. P. Hammond, merchant of Mono Lake, is owner of a group of eight claims, with one tunnel 200 ft. in on an 8 ft. ledge, and also other tunnels 30 to 300 ft. The value of the ore is about \$10 treated at a 5-stamp mill and over plates.

J. M. Stevenson owns a group of two claims with a shaft 10 ft. deep on a 4 ft. ledge, with milling values of \$8.50 to the ton in gold.

## COLORADO.

### Denver.

Owing to the fall in the price of tungsten from \$11 to \$5 per unit, for a 60% concentrate, occasioned by the closing down of the steel mills in the east, most of the large operators mining tungsten in the Boulder district have either ceased operations or are carrying on development work only. It is expected that when the steel plants start up again the price will return to the old point and mining will be resumed.

Manager C. E. Lake of the Boulder county mines will add to his force of 15 men and get the Boh Cat and Lone Tree properties into shape for a good production.

N. H. Mills and W. T. Harpel have sold their tungsten property near Nederland to Denver and eastern men. This property has been under steady development for the past two years and a number of good ore bodies have been opened up.

A rich strike of brittle silver ore has just been made in the Alton tunnel on the Little Jimmy claim, in the Caribon district. The high values found in an 18-in. vein are said to average about \$100 to the ton. The values in a 4-ft. vein are reported to vary from \$36 to \$100. Drifting and blocking out ore will be continued.

Curtis & Hine of Colorado Springs have announced that work will be resumed on the Eastern Colorado Power Co.'s power project on Middle Boulder creek in Boulder county. This plant will furnish some 30,000 h. p. and contemplates an expenditure of \$2,000,000. At the time of the panic the working force was cut down from about 70 to less than 20 men, but has recently been increased to nearly 200 men. Two reservoirs, having a capacity of 500,000,000 cu. ft. each, are to be built above Nederland for storing flood water to supplement the creek. Work has been started on the excavation of the lower or Barker dam, which will be of concrete 165 ft. high. The water will be piped 12 miles to the power station on Middle Boulder. This plant will furnish cheap power for mines and industrial establishments in the county.

The International mine at Robinson, Summit county, is shipping a greater tonnage than for a long time past. This property has been a producer for the past year. Much important development work has been done during the past few months

which has resulted in the increased output. A large force of men is now employed.

The Revenue Extension Mining & Tunneling Co. owns a group of seven claims on Revenue mountain, half way between Argentine Pass and Montezuma, and has a bond and lease on four others. The company has made arrangements to operate through the old Mallery tunnel on the Revenue property. The property has a production record of about \$1,000,000.

At the Anchor mine in Willis gulch, near the War Dance, the shaft is being sunk 200 ft. deeper than the present workings at 300 ft. An electrical equipment will soon be installed.

The Mountain Flower Mining & Prospecting Co., owning two groups of claims on the east branch of Deep creek eight miles northeast of Telluride is carrying on development work, extending its crosscut tunnel to cut the Delta vein at a depth of about 300 ft. Buildings have been erected at the mouth of the tunnel for the installation of air drills, the machinery for which will be installed as rapidly as possible. When this machinery is ready the work will be pushed. It is estimated that the tunnel will have to be extended 1,000 ft. farther before the vein will be met. Manager J. E. Clemmings is in charge of the work.

George Maloney and associates, operating a lease on the Concrete property west of Central City, have opened a streak of very high grade smelting silver ore showing wire silver.

Daily shipments of from 40 to 50 tons of a fair grade of milling ore are being made from an ore body on the 11th level of the Sleepy Hollow mine. Beside the mill ore is a streak of smelting ore that returns \$70 in gold, silver and copper. The working force is being increased preparatory to making a larger output. L. R. Tatum is manager of the property.

The Ross Mining & Milling Co. of Silverton is operating the Congress mine at Ouray. The unwatering of the mine has been completed and the shaft is being timbered. The property will be extensively developed during this year and machinery will be installed.

A streak of high-grade ore 10 to 20 ins. wide and said to assay above \$100 to the ton in silver and lead has been struck in the Scepter tunnel, 2,800 ft. from the portal. The Scepter vein is thought to be an extension of the Sunburst. A raise is to be carried 200 ft. to connect with the Sunburst level and through which all the ores of both properties will be taken out.

A strike has been made on the Great Scott lode seven miles from Idaho Springs at the junction of Cumberland gulch and Fall river. The pay streak is from 18 ins. to 2½ ft. in width, carrying values in gold, silver and lead. This property is in the same mineral zone as the War Dance. The property is owned by Mrs. Concher of Aurora, Ill. F. Purdy of Idaho Springs, and Mart Miner of Denver. Chas. A. Leu has a large contract on the property and development work will be rapidly pushed.

Work is soon to be resumed on the property of the Ramsdell Gold Mining & Milling Co. in the Georgetown district.

The raise already started will be carried until it intersects the Market crosscut. It is probable that the milling plant started some time ago will be completed and that a Haulway will be installed for the purpose of denigrating whether or not it can effect the saving claimed.

It is the intention of the management of the Holtberg Mining & Leasing Co. to sink a shaft from the sixth level of the Bellevue-Hudson to a depth of 600 ft., from which point drifts will be run east and west to prove the continuity of the ore shoot. A drift will also be run east 300 ft. to catch the junction of the Anamosa and Hudson veins from which, in higher workings, some high-grade ore was taken a few years ago. A hoist will be installed and also an electric pump for taking care of the water, which has been troublesome in the past.

A rich body of smelting ore has been cut by the Tobin tunnel of the Waldorf Cons. Mining Co. in the East Argentine district. The streak which is 3 ft. wide is said to average \$75 to the ton in gold, silver and copper. There is also from 5 to 6 ft. of mill drift along side of this said to assay 114 ozs. gold, 35 ozs. silver to the ton and 11% copper. The ore is to be opened up by drifting and a slope started.

Good progress is being made on the Marshall-Russell tunnel in the Upper Clear Creek district, and it is now in about 1,700 ft. During May 100 ft. was driven in 20 working days. A number of veins have been cut, the first of importance being the Neel, which has yielded considerable medium-grade ore from the shaft workings. The tunnel will cut the richest mineral zone at about the 2,500-ft. point. The Marshall-Russell Co. controls 12,000 ft. of ground lying along the course of the tunnel.

Large developments are to be made by the Kennedy Gold Mining Co., operating the Centennial mine on Leavenworth mountain at Georgetown. It is stated that the tunnel at the head of Rose street, now in 500 ft., will be extended from 300 to 400 ft. and the ground put in condition and offered to the public for leasing. The depth now reached is about 250 ft. but for the remaining distance it will make rapidly, giving much available stoping ground.

### Cripple Creek.

Thomas McColl and others, leasing on the dumps of the Moon-Anchor mine on Gold hill, recently shipped in a single day 378 tons to the Standard mill of the United States Reduction & Refining Co. at Colorado City. This makes a total of 1,500 tons shipped since June 1. The shipments, which were of unsorted rock, gave returns of from \$6 to \$15.00 to the ton.

Extensive developments have been begun on the Lester W. Janet W., and Laura M. claims on Beacon hill by a leasing syndicate at the head of which is Dan Stewart of Victor. The syndicate has a 2-years' lease with a flat royalty of 20% on all ores marketed. Machinery is to be installed at the shaft on the Janet W., which will be carried to a depth of 500 ft.

Shipments have been resumed from

the Sunshine claim on Galena hill by lessees of the Fort Pitt Mining Co. of Pittsburgh, Pa. Up to 1904, this property produced about \$25,000, but has been idle since that time.

The Ophir Mining Co., operating on Raven hill, is sinking a new vertical shaft to the 1,000 level. This shaft is already down to the 350 level, but, as water has been encountered, progress will henceforth be slow. The company is not anxious to hurry the work as it is mining an abundance of ore from the old incline.

The Cons. Copper Creek Co., operating the Delmonica property on Bull hill, is preparing to sink its main shaft to the 1,100 level. The shaft is already down 975 ft. It is expected that, at the final depth, the ore bodies found in the Finley and Vindicator will be encountered. These will be opened up by laterals.

The new Stratton Independence cyanide mill is completed and a test run in 1,000 tons of ore has proven satisfactory. This mill will have a capacity of 5,000 tons per month. Low-grade ores from the Independence mine, formerly sent to the United Reduction works at Colorado City, will be treated at the new mill and their shipment stopped. The higher grades will be shipped as before.

The mill at Gillette, recently rebuilt, has started up and is now in successful operation. Ore from the old Kimball dump, carrying from \$5 to \$6 to the ton, will be treated. Enough ore is in sight to keep the mill going for six months at a capacity of 150 tons daily. The property is leased by O. B. Grimes & Co.

Work has been continued on the dumps of the Crown Prince Albert properties on Beacon hill, under sub-lease to Campbell & Wilson. The dumps, containing a high tonnage, are especially high grade as they were formed when \$10 and \$12 values could not be profitably shipped.

A lease on the Belmont claim on Beacon hill has been secured by Lippert and associates who are taking pay values from the 100 level.

#### Montezuma.

J. P. Simon, president and general manager of the Montezuma Mining & Milling Co., and C. Tepeorten, of Superior, Wis., recently visited their property, the Quail group of four claims. Mr. Simon reports that a high-grade body of lead ore from 10 to 40 ins. wide is being exposed. The ore has a value of from \$40 to \$60 to the ton, in gold, silver and lead. The quantity of mill dirt is about three times that of the high-grade ore and is of unusual richness. Regular shipments will be begun about July 15. The company is a close corporation composed of business men of Superior, Wis. Extensive improvements are planned, including the erection of a mill at an early date. All available help that can be used is employed. Superintendent James Ames of Montezuma is in charge of the work. The following are the officers of the company: J. P. Simon, president and general manager; Fred Tepeorten, vice-president; Fred Koehler, secretary; P. P. Simon, treasurer; all of Superior, Wis.

## IDAHO.

### Mullan.

A special meeting of the stockholders of the Copper King Mining & Smelting Co. was held at the company's office in Mullan on June 15. It was decided to drive a lower tunnel 3,574 ft. in length to open the vein at greater depth and active work on it has already been started. A wagon road has been completed to the tunnel and grades made for all necessary mine buildings. When completed the tunnel will open the vein 925 ft. below the old tunnel level, where the vein shows 2 ft. of solid galena ore. Water power for a compressor plant will be used. It is estimated that the tunnel will be completed within 18 months after the machines are started.

Quite a number of miners are working in the Copper Mountain district, east of the Snowstorm. The district has been only slightly developed near the surface, and some good showings were made for small depth gained. The strongest surface showing is on the Chipmunk group of claims. The ore is a green copper carbonate.

Three men are working on the Mullan Bell, driving a drift along the vein, which shows this green ore similar to that of the Snowstorm.

The new crosscut tunnel on the Reindeer property is now in a distance of 965 ft. The contractors have been making 250 ft. per month with six men employed. The tunnel will be 3,000 ft. long when completed.

### Wallace.

The new mill of the Charles Dickens Co. has been started and will be operated steadily as long as a good market can be found for the ores. The plant is operated by steam. A Blake crusher and five new Wilfley tables have been added to the equipment. The capacity of the plant is 100 tons per day.

The Golden Chest Co. is perfecting plans for the resumption of work at the mine, which is the largest free gold property on the North side.

The Midas Co., operating on Garfield bay in the Lake Peud d'Oreille district, is reported to have opened a streak of galena ore 3 ft. wide in its lower tunnel. The company employs 50 men and is working in three tunnels.

George Lamb of Wardner has made a discovery of manganese ore in the North Fork River district. The extent of the discovery is not known.

The Butte & Coeur d'Alene Mining Co., whose mine is in Gentle Annie gulch, has let a new contract for 100 ft. of work in continuation of the development work started last fall. The company drove 700 ft. of tunnel during the winter and encountered a vein of high-grade silver-lead ore. The present work will be to determine the extent of this ore body. The company is largely held by Mullan people, Larry Dooling, James and Tim Quinlan being the heavy stockholders.

The Hecla is now running 350 tons daily through its mill at Burke, and shipping the product to Salida, Colo. Mining is in progress on two levels and 110 men

are employed. Work on the sinking of a double-compartment shaft will probably begin within a few weeks.

The Charles Dickens Co. has begun concentrating ore on a small scale. There still remain to be installed settling tanks and vanners, which will be accomplished soon, when the plant will be put to its full capacity of 150 tons daily. A large quantity of ore is already banked for milling.

The East Snowstorm mine has been forced to abandon its crosscut tunnel, temporarily, owing to a heavy flow of water. This occurred in the face of the 240-ft. crosscut to the parallel vein, and is regarded as good evidence that the footwall is near at hand. The rush of water is so great that it has weakened the walls of the outer tunnel and men are constantly employed easing the timbers, as this is badly broken and soft ground for several hundred feet.

A meeting of the stockholders of the Mineral Farm Mining Co. was held June 25, and recommendations were made that a large sum be spent on development at once. Specifications for about \$20,000 worth of work were submitted, and it is thought they will be embodied in plans for immediate work. A. M. Strode of Mullan has sold his controlling interest to a number of Spokane and Missoula (Mont.) men.

It is given out here that development work on the Marie mine will be resumed at once. Retinering has been completed.

P. F. Smith has been appointed receiver for the defunct Amador Mining Co., under \$5,000 bond. Investigations into the charges of fraud will be made, and such resources as the mine has will be cared for.

### Elk City.

The Espy property, which was bought last fall by eastern people, is now adding five stamps to the small 2-stamp mill now at the mine and will extend its development and operation. A third tunnel is now being run, the two short ones having given ample proof of good ore bodies.

A new property, the Idaho Mascot, owned by John and Ed. Massam, has come into prominence here. Some high-grade float has been found, and a prospect tunnel now being driven on the lead shows high-grade free gold and some tellurides.

The Del Rio mine is under constant development and is showing up well.

A recent strike on the Gold Crown mine, which adjoins the Del Rio, has created considerable interest in this district. The ore is high-grade free-milling gold. Development is now in progress.

#### MISCELLANEOUS CAMPS.

The Crackerjack mine in the Buffalo Hump district has been bought by Michael Sweeney of Spokane, Wash., for \$80,000. The mine owed heavy debts, amounting to about \$20,000, and was sold under mortgage. It contains large low-grade gold ores, but has not been worked for some time.

## LAKE SUPERIOR.

## COPPER.

Houghton, Mich.

The most important development for some time past in this district is the cutting of a rich amygdaloid bed by a diamond drill hole pitched southward from the end of a southerly crosscut on a lower level of the Adventure mine. The core was 26 ft. in length and very rich in copper. As the hole was bored at approximately right angles to the dip of the beds of the Keweenaw series, the core reasonably may be presumed to represent a cross section of the copper bearing bed.

The rich find is not only of the utmost importance to the Adventure, but is of almost equal importance to the Lake Copper Co. as well. As the copper bearing lode of the Lake is a typical amygdaloid trap, the hypothesis that it is a fissure vein is not tenable, and it also is impossible that a trappean bed should cut across the two hundred separate trap flows constituting the series. The only conclusion possible is that there is a gigantic fault in the vicinity of the Lake property. The rich core of the Adventure was secured in the hypothetical horizon of the westward extension of the Lake bed, and while the identity of the bed encountered by the drill can be determined only by several years of underground development, by both Adventure and Lake, there is very strong evidence that the Adventure actually has cut the Lake lode.

Of all of the developed mines of the Lake district, Adventure gave the least promise, and was the only producing mine to suspend output because of the low price of copper. While several years of hard work will be required to open a new mine, the prospects of the Adventure have changed so radically within a few days that from the least of mines it has become among the best of prospects.

While the Lake and Adventure are the chief beneficiaries of the discoveries made on the Lake lode, there are possibilities for the Mass and the Michigan. The Mass has two chances at the Lake lode, as also has the Adventure, having a second tract. The near proximity of the Mass to both the Lake and the Adventure render it reasonably certain that the Mass also possesses the Lake bed, if the lode found by drill on the Adventure really be the Lake amygdaloid. Still further west the Michigan has an immense acreage, and should this carry the Lake amygdaloid, as rich as found in the Lake shaft or the Adventure drill core, the Michigan would have about twice as much of the lode available for mine making as the Lake, the Adventure or the Mass.

The geology of the Michigan mine is among the most interesting found at any Lake Superior mine. Sixty years ago the Minnesota mine, the second really great and successful mine of the Lake Superior district, was opened on lands now owned by the Michigan. The copper bearing bed of the Minnesota has been variously described as a conglomerate and as a contact vein, the metal occurring in a conglomerate bed and the footwall of a bed of trap, the mineralization being so heavy

that the dense trap carried payable copper for several feet from the contact. The present Michigan mine was opened on the Calico amygdaloid, a bed lying only 140 ft. north of the old Minnesota contact and parallel with it. At depth a peculiar fissure, with gangue of country rock richly charged with copper, was found running practically parallel with the trap beds as to strike, but shearing downward at a much sharper dip. This vein ran from the Calico amygdaloid into the old Minnesota contact vein at depth. There also are ore bodies known as the footwall and the hanging wall branches on either side of the Calico, and sundry unnamed feeders and branches. The mineralization in the Michigan and the old Minnesota, now part of it though not worked, is unusual and most interesting. Should the Lake lode, which is wide, as well as rich, repeat the characteristics of the Kearsarge and Baltic beds, now the master amygdaloids of the district, it will be found payable for many miles.

The Kearsarge is being mined for nearly 18 miles, from the Ojibway to the Tecumseh, and the Baltic for about nine miles, from the Globe to the Isle Royale, while the limits of payable ore have not been determined at either end on either the Kearsarge or Baltic beds.

## IRON.

Marquette, Mich.

While ore shipments are steadily enlarging, there is no radical change from recent weeks in conditions in the Lake Superior iron region. Not a mine on any of the ranges is being worked to its maximum capacity, and only a few of the properties at which work was suspended following the close of the preceding season have resumed operations. More ore is coming from open-cut producers on the Mesabi and from stockpiles in the older districts. Working forces have been increased somewhat, particularly on surface, as is usual when shipping is in progress.

Conditions show material improvement compared with those prevailing at the opening of the season. Sales are being recorded and more steam shovels are gradually being put into commission in the Mesabi fields. Active stripping of ore deposits is going on on the Mesabi range in preparation for future production.

An order for 40,000 tons of the silicious ore of Oglebay, Norton & Co.'s Empire mine on the Marquette range has resulted in a resumption of work at this nulling pit. This company is again busy at its Chatham properties in the Iron River district of the Menominee, and operations are also to be resumed at its Bristol mine, in the Crystal Falls field, from whose large stockpile some ore has already been moving.

In the same district Corrigan, McKinney & Co. have taken on 150 additional men.

Forces have likely been increased at the Mineral Mining Co.'s new James mine at Iron river.

On the Mesabi range the Steel Corporation's Hull and Burt pits are almost as active as a year ago, and they are mak-

ing heavy shipments. Additional shovels have also been put to work at the Steel Corporation's Fayal and Adams properties.

The Sturgeon river was not diverted into the new channel excavated for it at the Loretto mine, Menominee range, the past week, as was expected. More rock was encountered than was estimated and a steam shovel broke down. The work will probably be completed before July 15. Preparations are being made for a resumption of mining operations on an important scale as soon as the river has been shifted away from the ore body. It is expected that it will take fully ten days to unwater the lower workings. Some mining is now being done on the upper levels, and the company is employing about seventy men, underground and on surface.

Because of delayed machinery the blast furnace being built by John T. Jones and associates at Iron Mountain will probably not go into commission much before the middle of August. The result of the initial operation of this plant is awaited with interest in the Lake Superior region, as it is proposed to make steel direct from ore at a low cost and to utilize low-grade ores now of little commercial value. Tests conducted in a small experimental furnace have been entirely successful. Electricity will be used for motive power at the plant, and a contract for it has been made with the Iron Mountain Electric Light & Power Co. Current equivalent to 150 h. p. will be furnished during the day, and 50 h. p. at night. The furnace project represents an outlay of upwards of \$100,000. It is understood that options have been secured on large bodies of Menominee range low-grade ores.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week of June 27 and the year to date were as below in pounds:

## LEAD ORE SHIPMENTS.

Camps.	Week. June 27.	Jan. 1- June 27.
Alba-Neck City .....	102,560	102,560
Aurora .....	176,190	176,190
Badger-Peacock .....	15,840	15,840
Carl Junction .....	110,870	110,870
Duenweg .....	47,170	2,081,900
Galena .....	582,640	2,050,580
Granby .....	100,000	826,760
Joplin .....	236,590	1,193,400
Miami .....	530,710	530,710
Oronogo .....	1,130	283,820
Prosperity .....	1,450	1,450
Quincy .....	2,842,170	2,842,170
Quincy-Baxter .....	62,730	586,470
Seneca .....	15,740	15,740
Springfield .....	27,020	27,020
Spurgeon-Spring City .....	72,830	525,480
Webb City-Charterville .....	1,008,570	18,550,290
Zincite-Sherwood .....	5,530	127,760
Total, lbs.	2,157,310	37,310,460
Value .....	\$68,982	\$994,141
Total, 1907, lbs.	2,651,640	49,554,249
Value .....	\$94,137	\$1,994,343

## ZINC ORE SHIPMENTS.

Camps.	Week. June 27.	Jan. 1- June 27.
Alba-Neck City .....	726,300	11,909,240
Aurora .....	550,750	8,827,060
Badger-Peacock .....	716,640	11,958,800
Carl Junction .....	457,960	4,967,960
Charlton .....	375,430	3,632,610
Cave Springs .....	683,700	683,700
Duenweg .....	425,270	15,075,270
Galena .....	608,640	18,717,060
Granby .....	240,000	10,922,550
Joplin .....	1,503,350	55,281,400

	Week June 27.	Jan. 27.
Miami .....	296,630	1,888,426
Oronogo .....	52,030	8,398,480
Pocahontas .....	125,890	414,580
Prosperity .....	300,210	6,977,750
Quinnipiac .....	125,890	2,729,540
Reeds .....	125,890	162,850
Sarco .....	72,010	2,175,310
Seneca .....	172,500	56,500
Spartanburg .....	172,500	5,567,150
St. Louis City .....	172,500	182,290
Webb City .....	3,725,650	71,629,190
Wentworth .....	54,940	797,020
Zincite-Sherwood .....	121,970	1,607,460
Total, lbs.	10,216,590	240,098,400
Value	\$164,631	\$4,089,450
Total, 1907, lbs.	12,776,210	215,900,000
Value	\$282,792	\$7,372,374

Webb City. A number of additional mills closed down the latter part of the week in the Webb City camp owing to the low price for zinc. The Fullerton and the Diamond Jack, both active producers, were burned, still further increasing the list of mills out of commission. It is reported that unless a decided increase in the ore price is noted a concerted move will be made by the strictly zinc producing properties for an indefinite shutdown until a permanent higher price prevails in the zinc market.

A rich mine has been opened in Webb City northwest of the Frisco depot by the Smithfield Lead & Zinc Co. The shaft was sunk into a rich deposit with a 14-ft. face. A drift has been run a distance of 75 ft. and rich dirt was removed the entire distance.

A new company has taken a lease upon the Eclipse land south of Cartersville adjoining the American Zinc & Lead Co. This tract is practically virgin territory. Drifting has been done up to the limits of the lease. Two shafts have been sunk, although they were abandoned with very little work being done. A third shaft is being sunk in the southeast corner to catch the deposit worked up to the limit on the adjoining lease.

The Continental Co., on the lease near Johnston, will start up after a long shut down. During the shut down the ground became flooded and the pumps were kept in steady operation for several weeks to drain the ground. The water caused great trouble in the mines in that portion of the camp for it not only flooded the ground, but it became very acid and injured the pumps and water columns. The Continental mill is being remodeled and a new storage bin and crushing room added, which will increase the capacity of the plant and insure greater regularity in operation. The skip system of hoisting is employed at this mine.

A mill of 100-ton capacity has just been completed on the Waddell lease northwest of Carthage, and will at once be put into active operation. The erection of the plant followed a thorough testing of the ground by drilling and later development by shaft sinking. Ore was found from 75 to 120 ft.

Increased activity has been noted in the Alba camp the past few weeks. Two new producers entered the field last week, the Big Fly Mining Co. with 111,880 lbs. of zinc, and the Grace Mining Co. with 22,000 lbs. of zinc. The total for that camp is now near the million-pound mark. A new tailing mill will be oper-

ated in Alba and a company has been organized to work the old West Side tailing pile.

#### Joplin.

The Delta Mining Co. has resumed operations after a shut down of several weeks. The mill has now started upon a large dump pile of crushed rock and ore removed during the underground development. Work is being done at the 150 level upon a good body of lead and zinc. Water is causing serious trouble and heavy pumps have been installed.

West of Joplin, the Helen Zinc Co., composed of A. H. Baker and associates of Kansas City, has developed a rich zinc deposit at 135 to 140 ft. A chimney formation pitching downward was found running from 15 to 25% zinc. The company holds a lease upon part of the Norton Mining Co.'s land upon which some rich ore bodies have recently been opened up.

The old "I Know" property belonging to the Old Dominion Co., west of Joplin, is again active. Four separate companies, besides a company running the tailings over the mill a second time, are actively engaged. Broadhurst & Co., operating on three lots in the southwestern portion, has sunk a shaft into good lead ore at 90 ft. No zinc is found, but the dirt is very rich in lead. On the same tract the Arnold Co. is operating a deposit of lead and zinc though the lead predominates.

A new shaft is being sunk at the Paragon mine west of the city. This is done to open an additional stop and furnish enough ore to keep the mill running steadily. The new shaft will be connected with the mill by an incline tramway. The mine is operating in sheet ore.

The New Hermit Mining Co., upon whose ground a rich strike was reported last week, has just opened a richer deposit while driving a drift. The dirt runs as high as 25 and 30% zinc. A new shaft is being developed north of the mill, which will be connected with the mill by a tramway. The mill is being placed in readiness for operating during the underground development.

#### Miami, Okla.

The most important event of the week in Miami was the starting of the Moose mill. The initial run was made just 41 days after the foundation was laid. The net run of the day was 10 tons of zinc and 5 tons of lead. The hopper was filled with ore for the trial run so there was no cause for delay and all went smoothly.

The richness of the Miami camp can be seen by the record of the New State mill. It is a small and inefficient plant of about 50 tons capacity, yet in a 30-day run 450,000 lbs. of zinc and 307,000 of lead was milled, while about 10% of the ore went into the tailing pile on account of the inefficiency of the plant.

Chas. Ellis is pumping the old Indiana at Lincolnville and as soon as the ground is unwatered men will enter the ground to work. This mine was a good lead producer and will be operated again.

J. W. Weaver of Webb City has leased the Wauhatchie and is making a derrick upon which a new steam hoist will be lo-

cated. A shaft is now down to 83 ft. and will enter the ore in 17 ft., if the drill record is verified. An unusually rich ore deposit was found here by drilling.

## MONTANA.

### Butte.

Because of floods, damage to the Great Falls smelter of the Amalgamated Copper Co. and washouts on railroads, the June copper production of the Butte district was less than 50% of the normal. All of the mines, with the exception of a few small ones, were closed entirely for 10 days, and some of the Boston & Montana mines were closed all the month with the exception of two days. Two of the Boston & Montana properties were operated 12 days, which constituted the operations of that company for the month. The Anaconda and St. Lawrence mines, the two largest producers of the Anaconda Copper Mining Co., were closed 10 days by the floods, and after reopening and operating for a few days were forced to close again by a fresh outbreak of gases from the fire that has been burning above the 1,100 levels of those mines since 1889. The estimated production for the month was 13,159,000 lbs. from 150,350 tons of ore. The total ore tonnage, the estimated yield of copper per ton and total copper production contributed in June by the various companies are as follows:

Companies.	Tons copper ore, per ton.	Lbs. copper.	Total lbs. copper.
Boston & Montana .....	24,400	99	2,444,000
Anaconda .....	72	24	1,728,000
Butte & Boston .....	1,200	70	84,000
Washoe .....	6,000	60	360,000
Parrot .....	1,500	66	99,000
Trenton .....	6,000	62	390,000
North Butte .....	3,000	118	354,000
Butte Coalition .....	17,000	100	1,700,000
Original .....	22,000	85	1,870,000
Pittsburg & Mont. .....	4,650	80	372,000
<b>Totals .....</b>	<b>150,350</b>		<b>13,159,000</b>

The annual meeting of the stockholders of the East Butte Copper Mining Co. will be held on July 8, when a new board of directors will be elected and the main office of the company transferred to Boston. A majority of the directors and the president will be residents of Boston. The company has been refinanced through the unusual action of President Frank M. Sullivan and General Manager Patrick Wall, who, although the treasury had about 90,000 shares of stock, donated the greater portion of their individual holdings to raise money for the treasury, rather than sell treasury stock at the present depressed market price. Through their donations and smaller donations by two others a fund of \$150,000 has been raised. All obligations of the company have been paid and more than \$100,000 remains in the treasury for a working fund.

Suit has been instituted in the federal court at Butte against the Butte Central and Boston Copper corporation to force it into bankruptcy. The company has apparently been unable to raise money with which to pay off its indebtedness, and a number of its creditors joined in the bankruptcy proceeding.

The British-Butte Mining Co. has

placed an order with the Risdon Iron Works of San Francisco for a dredge to be installed by the first of October. It is claimed that the ground so far tested will yield an average of 50 cts. per yard, and that the dredging cost will not exceed 5 cts. The dredge is to work to a depth of 30 ft., but the greater values lie deeper. If the dredge proves successful some scheme will be devised for mining to a greater depth. A shaft has been sunk to a depth of 680 ft. and from that a bore 310 ft. deep has been made without striking bed rock.

The Butte & Superior Co. has been able to continue work by issuing half a million dollars worth of bonds and getting repeated continuances of payments on the properties. This company, however, acquired three or four old mines from which lessees have been taking ore and paying royalties to the company. The work by the Butte & Superior Co. is limited at present, pending the arrival of a large new electric pump. The shaft is down 1,175 ft., and it is the intention to install the pump at the 1,200 level. A drift is being run between two veins in the Jersey Blue, but they will not be crosscut for some time for fear of increasing the flow of water. The big vein which was recently cut on the 1,000 level has not been explored, but will be as soon as the new pump is in place.

The Lion Gulch Mining Co. has started a 3-compartment shaft on its property in the Continental district, eight miles southeast of Butte. The company is employing 30 men, most of whom are engaged in building a wagon road from the railroad to the property. As soon as the road is completed, the new machinery will be taken to the mine and the property equipped for deep sinking. Operations are under the management of John Hewitt.

The shaft of the Tuolumne Mining Co. has been sunk to a depth of 1,650 ft. since the company began work two years ago, and 1,200 ft. of crosscuts and drifts have been opened. Three stations have been cut and two veins prospecting on the 1,000 level and crosscutting for the third vein is now being done. The apex of two ore bodies has been encountered in the south vein. These ore bodies have a combined length of 600 ft., but the ore is not of commercial value at that depth. The other vein prospecting does not show any ore bodies. Manager Sheehan recommends the installation of larger machinery, capable of sinking to a depth of 2,000 ft.

#### Helena.

An 8-ft. ledge of very rich free-milling ore has been struck in the Umanilla mine nine miles west of Clough Junction in the Seven Mile district. This property has been operated for 25 years by the present owner with occasional strikes of rich pockets and stringers. The ledge just found is believed to be the long-sought mother lode. The property has never produced regularly, but a mill was erected some time ago that has run spasmodically and milled many thousand dollars.

Another rich strike of free-milling gold ore has been made on the properties of

the Mutual Mining & Milling Co. in the northwestern part of Lewis and Clark county, while crosscutting on the Mukden claim. It is said that the ore will assay about \$100 to the ton. The company's holdings consist of three properties, the Makden, Lio Yang and Handicap. As a result of the strike the working force has been materially increased and extensive development work will be carried on throughout the summer. It is the intention of the directors to erect a 5-stamp mill for treating the ore and to increase its capacity as warranted by developments. The company is controlled by Helena men. The officers are: Paul S. Peterson, president; Thomas Silkers, vice-president, and G. F. Brown, secretary-treasurer.

Work is being actively pushed at the Bell Boy and a large force of men is engaged in putting things in shape for a steady production. A new road has been built for hauling ore to the Bald Butte mill and it is expected that 10 stamps will be kept dropping regularly. A boiler and hoist have been installed for sinking a shaft to a point 100 ft. lower than the previous lowest level.

#### MISCELLANEOUS CAMPS.

**Wicks.**—Activity in this district was not materially affected by the recent heavy storms. Much successful development has been carried on and some promising copper veins have been cut. H. C. Klein has driven a 200-ft. tunnel on the property of the Butte-Standard Co. on the Boulder-Wicks divide. It is expected, in a short distance farther, to cut the main lead at a depth of 245 ft. This lead was cut by the tunnel of the Montana Central railroad and a wide vein of good ore was disclosed.

John McMinn of Bozeman has recently taken options on several good properties in this district.

Samuel Myhras has leased and bonded his interests in the Amazon-Wicks district to L. H. Harriman of South Dakota for a period of 18 months for \$42,000. It is Mr. Harriman's intention to begin work soon.

**Leavenworth.**—An important strike is reported from the Kendall mine in a crosscut from the bottom of the shaft sunk 200 ft. below the former lowest workings.

**Argenta.**—On the strength of the recent discovery of an 8-ft. vein of 8% copper ore on the Great Eastern mine, stock was subscribed at a recent meeting of stockholders in amount sufficient to pay for sinking the shaft 100 ft. deeper. The contract for the work has been let to J. O. McCoy. It is expected that, as soon as the sinking is completed, ore will be stoped. The ore will be treated at the Polaris smelter.

## NEVADA.

#### Goldfield.

J. D. Hubbard of Chicago and associates have purchased the Lucky Boy group about six miles southwest of Hawthorne for \$350,000 from J. H. Miller, J. E. Adams and Ed. Haller of Hawthorne. The former owners had opened up a 546-

ft. ledge of lead ore with stringers of silver in a tunnel at a depth of 500 ft. and much valuable ore is in sight.

Work of developing the large rich ledge on the Combination Fraction is being pushed. Shipping ore is being broken on two levels in a vein 60 ft. between walls and crosscuts are being driven to catch the ore shoot on the 600 level from the Oddie lease shaft. The vein was first struck on the 427 level near the shaft and has yielded shipping ore from the start. A 40-ft. raise has been made in ore from this level. The 387 level and a level at a depth of 283 ft. have reached the ore.

The Commonwealth mine has struck shipping ore on one of its leases at a depth of 40 ft. The ledge is 4 ft. in width and averages about \$50 to the ton.

The Florence Goldfield Red King Claim Leasing Co. recently cut two veins while drifting on the 450 level on the Red King claim of the Florence. A 50-h. p. hoist has been installed and power drills will be used. The shaft will be sunk to the 550 level.

#### Jessup.

This camp, 10 miles westward from Hinxley on the Southern Pacific, had its first location and discovery in February, 1908. The district, as afterward organized, comprises an area about five miles wide by 10 miles long. It is also in line of continuation of the Seven Troughs district and about 20 miles to the south. Throughout the district are andesite, porphyry and, in many portions, basalt dikes. The andesite and porphyry dikes have a northeasterly and southwesterly trend and it is against and following these dikes that the veins are found, dipping to the westward, using the andesite for foot walls. They increase with depth from 4 to 40 in. at the surface to 18 in. and 2 ft. at 40 and 50 ft. of depth. Rock broken from the many dikes forming the big series almost invariably pan free gold. All of the ore in the district where uncovered to a few feet below the surface carries iron.

One of the prominent companies doing systematic development is the Jessup Mines Co., which, after organizing took over the Mary H. and Mary H. No. 1 claims, in the central portion of the district and fairly well in the townsite. Three sets of leases are at work. Lease No. 1 is operated by Hubbard, Morrison & Henny. The collar of the shaft is 15 ft. away from the outcropping. The vein matter begins at the surface and gains in width with depth. Surface values are from \$10 to \$25 to the ton. At 50 ft. after having cut through the ledge as expected, the footwall will be crosscut. Drifting on the ledge and stoping of the ore will follow.

Lease No. 2, a block 300 by 600 ft. (as are all leasing blocks), is under control of C. G. Logan and Mr. Coohy. The vein is 6 in. wide at surface and at 12 ft. widened to 2 ft. The rock is highly impregnated with gold. At 60 ft. in depth a crosscut will be driven through both the vein and the andesite dike.

Block No. 3 is leased to Taylor, McLeod and associates. The ore is a shoot of good values. At the surface values of

\$66.50 to the ton are obtained, at points 2 and 4 ft. in depth from \$10 to \$40 to the ton. The shaft is being sunk at some distance from the vein. At 80 ft. a crosscut will be driven. It is expected that before 60 days a gasoline hoist will be in operation on lease No. 2. Application for patent already has been made upon the Mary H. claim. The officers of the company are Charles L. Colo, president; J. H. Barritt, vice-president, and Wayne T. Wilson, secretary and treasurer.

About a mile westward from the Jessup Mines Co.'s property is that of the Stewart Mining Co., consisting of a group of three claims. The ore is largely oxidized and gives good values in gold. Six sacks of ore taken out above 80 ft. and shipped to Selby, gave a gross return of \$115, and 30 sacks shipped to Western Ore Purchasing Co. gave a return of 5 1/10 ozs. of gold to the ton. At 100 ft. Adolph Kunze will drive a crosscut through the vein and also drift on vein matter. The main office is at Stockton, Cal. The officers of the company are: J. A. Stewart, president, and Thomas Heffernan, secretary.

Joseph Mackedon and associates lately disposed of a group of three claims one mile from town to Milwaukee, Wis., people, who immediately organized the White Canyon Mining Co. The amount to be paid is \$60,000 with a first payment of \$6,000 already made. The company has erected an office building in town and the property will be extensively developed, \$20,000 having been deposited in the bank for that purpose.

H. Hersey of Chicago has bonded of Joseph Mackedon and partner in the sum of \$70,000, with first payment of \$7,000 to be made July 1, a group of four claims in the southern part of the district. The main ledge is 50 ft. in width between walls of porphyry and andesite and porphyry. It is said to show average values near the surface of \$20 to the ton.

The Lytle group is near the southern end of the district. The 4-ft. ledge is well defined. The ore is freely specked with free gold.

F. H. Pettengill, prominent in mining circles of Colorado, has taken over from C. G. Logan two very promising claims and will at once organize a company.

The Jessup Cons. Mining Co. of Reno has taken over a group of claims south of the Ratliff property, which will at once be prospected and developed. Surface assays gave \$1.60 to the ton in gold and at 8 to 10 ft. in depth \$4 to \$8 to the ton. The officers are C. V. Randall, president; H. C. Dorman, vice-president; J. M. Benton, secretary and treasurer.

A promising property, by surface showing, is that of J. B. Ratliff, W. N. Mack and H. Loose, consisting of four claims about two miles north of Jessup. There are ledges and cross-ledges, and these, at conjunction, should show up well. A 25-ft. shaft disclosed one ledge with gold in view in many places.

A one-third interest in the Churchill group of two claims has been purchased by C. V. Randall of Reno. This property will at once be developed.

Two sets of leasers are at work on the Howard property. This is the Mabel B.

claim and the ledge is perhaps the strongest in the Jessup district.

There are many other promising claims in this district, but development is necessary to bring in capital. A stage line makes trips twice daily between Jessup and Huxley station.

#### Nelson.

Ground is being broken for the 150-ton Loder smelter, about one-half mile south-east of Nelson. Part of the machinery is at the terminus of the railroad within 22 miles of the smelter site. Development work is going on in many of the mines with the prospect of having a market for the ore taken out.

The Miners' and Mine Owners' Association has taken up the building of a wagon road to Jeans station, on the Salt Lake road.

A contract has been let for 150 ft. of sinking on the Techatticup mine, which will put that mine down about 850 ft.

The management of the Duncan property has let a contract for sinking the shaft to 700 ft., or about double its present depth.

The Tracy Engineering Co. of New York City is developing Capitol camp, lately purchased by them, and already a body of high-grade ore has been opened up.

O. A. Ellis, of the Victor-Queen Bee properties, has started a new crosscut tunnel to cut the ore body, and is taking out good ore, some running high in free gold. L. T. Sowers is running a crosscut from his shaft, finding, in 16 ft., sulphide ore averaging about \$28 to the ton. Jack Coyle and Mr. Burke are also developing their properties and taking out ore for the new smelter.

The Santa Barbara Mining Co., on Rich hill, is working a good force of men. Some of the ore on this property is of very high grade.

A. K. Knight of the Mizpah has his shaft down about 200 ft. in a good grade of ore, some of it running high in silver, besides carrying good values in gold.

Many other mines are working in this district and great activity is shown. Surface showings of the district are large and the mines operating have ore from the surface down and increasing with depth.

## OREGON.

### Grant's Pass.

The Takilna smelter, on the copper mines of the Takilna Smelting & Mining Co., have blown in for the regular summer season's work. Twenty-eight irrigate teams are employed hauling coke to the smelter, and returning loaded with matte. The company expects to turn out an extra large output of matte this season, as the smelter has blown in earlier than usual and has a mammoth body of high-grade ore to operate on. A crew has been employed in the mines all winter. The distance from Grant's Pass to Takilna is 45 miles, and the freight teams require five days for the round trip. The matte is shipped from here to Tacoma and Selby for refining. Most of the coke comes all the way from Japan.

That the copper mines of Waldo, in the

vicinity of the smelter are very rich, is proven by the fact that they pay good returns despite the heavy expense entailed in operating them, due to the long wagon haul. Were it not for the bad condition of the road in the winter, the smelter would operate continually.

A movement is now under way to macadamize the worst part of the road from Grant's Pass to the smelter. While this will not allow of hauling of coke and matte throughout the entire year, it will lengthen the present season of mining and copper smelting from four or five months to seven or eight and possibly ten months. This smelter has a capacity of 100 tons per day, but the copper ore of the Waldo mines is so easily smelted that the plant handles from 125 to 150 tons per day.

Most of the ore is taken from the Queen of Bronze, one of the properties of the Takilna Co. The Cowboy and Lytle mines, owned and under development by this company, and located near the smelter, also contain a mammoth body of ore. The ledges of the Waldo district are from 5 to 50 ft. wide, with varying values, although in most of the veins values of from 11 to 20% are carried.

The Gilman Bedrock Mining Co. has its scow and dredge almost completed and Manager Frank Gilman states that the plant will be installed and work begun early in July. The dredge will begin its operation on Rogue river at a point some 40 miles below Grant's Pass. This bedrock enterprise differs from the usual dredging method of mining, as it will "dry" the river bed in spots, and these spots, or portions, of bedrock will be mined. The dredge is shaped like a huge flailon and sinks to the bottom of the river, making a water-tight compartment. The water is removed by powerful pumps and a section of the river bed exposed. It is a well known fact that the bed of Rogue river, particularly that part of it below Grant's Pass, is rich in gold, but this is the first time that a method has been devised for successfully mining it. An ordinary dredger will not work, as the bed is solid rock and cannot be scooped up. By the method here described the bedrock itself will be cleaned of its gold.

The owners of the old Lucky Boy mines of Blue River district, have decided that the property will give better returns if the method of reduction is changed from stamp milling to a concentration and smelting, and the company is already preparing for the change. The 40-stamp mill has been shut down and will not be operated again. The mine lately passed into new hands and the new owners have begun the driving of deep tunnels lower down the mountain side to tap the main ore body at greater depth. The mine will be opened up and operated on a much larger scale than formerly. Power drills are being installed, and the camp will be lighted with electricity developed by the plant near Blue River mining camp. By the close of summer the Lucky Boy will be working more busily than ever before and the entire camp will be more active, as the building of a smel-



ter will necessitate a railroad connecting the mine with the main line of transportation.

The Blue Ledge Mining Co. has closed down the big Blue Ledge property on the upper Applegate for a prolonged period. Only a few employees have been retained, and these are engaged packing the machinery and equipment, to prevent rust and deterioration from long disuse. This company also owns large copper properties in Mexico, which it has had under development for the past three years, and these mines, too, have been closed. The management states that the unsettled condition of the money market in the east, where the company has its headquarters, is altogether responsible for the shut-down. About \$2,000,000 has been spent on the Blue Ledge.

## SOUTH DAKOTA.

### Custer.

On the old Golden Slipper property an exploration shaft, 200 ft. southeast of the old workings, was sunk to a depth of 14 ft., where it encountered the ledge, which, at that depth had a width of 2 ft. The ore showed good values by pan and mortar tests but not as rich as formerly. It is expected that the mine will be started up before very long.

It is stated that the pending deal for the sale of the Wandering Boy property near here has been declared off, but that the property will likely be operated by local people within the near future.

The Extreme property, formerly the Minnie May, and the Grand Junction and Hartford mines, are to be reopened, if present plans carry. J. Wayne Von Leer has just completed his examination of the latter property and it is understood to be satisfactory for development. H. McClelland, owner of considerable ground here, is negotiating with eastern men for the operation of the Extreme, which has a small plant on the ground and a good road prospect. This property was one of the bonanzas of the earlier days.

### Rochford.

This promises to be a busy season for this section of the Hills. On the Standby the long drift connecting is nearly completed. The old mill has been remodeled and placed in good condition to handle the ore until the new 100-stamp mill is completed. Work on this new mill will start in another month and by fall it is hoped to place it in commission.

The Golden West Co. is about to prospect a new ledge just discovered by means of a diamond drill. The drill hole will be put down to a depth of from 400 to 500 ft. to get the formation of the new ore body, which is said to exceed in value any hitherto found on the property.

### Hill City.

E. C. Johnson now has a force of men at work on the property of the Gertie Tin Mining Co., preparatory to making a steady run. Several pieces of new machinery including two pulp elevators are to be installed in the mill. One of these elevators will raise the crushed ore to the screen-sizing system, and the other will raise the middlings from the concentrators and return them to the Chilian mill

for regrinding. The fine screen sizing will be accomplished by three Sturtevant-Newaygo wet separators taking the mica from the ore and delivering a sized pulp product to each concentrator.

Superintendent Crocker is making good progress with the unwatering of the old J. R. property in both the shaft and the drifts and hopes to be able to commence some mining during July.

## UTAH.

### Salt Lake.

Jesse Knight has acquired the controlling interest in the Daisy Eastern group of nine claims, just south of the Iron Blossom properties in the Tintic camp, from Mark Hopkins and associates of Salt Lake city. Active development work will be inaugurated at once, and a permanent working shaft will be sunk.

Superintendent A. N. Holdaway of the Sioux Cons. Mining Co. announces the arrival at the mine of the new hoisting plant, and other equipment. Within 30 days it is said that the machinery will be in place, when regular shipments will begin. A station is to be cut at a depth of 350 ft. in the working shaft and drifting from that point to catch the vein on its east dip will be done. The first car shipped from the mine netted \$3,480, but there is a great deal of richer ore, which will be taken out and shipped. The management has announced that it will be able to pay a dividend early in August.

Taylor & Brunton have announced the completion of plans for the erection of an independent sampler in Tintic. The plant will have an initial capacity of 600 tons of ore daily, and will cost \$50,000. It is to be located at a point where the three railroad lines running into that camp will tap it. This sampler is to be built to accommodate ore shippers to the new Tintic Smelting Co. near Silver City.

Manager Ernest Rambarger of the Ontario and Daly-West mines, states that work at the face of the long drainage tunnel being sent out from the Ontario No. 3 hoist to intercept the Daly-West main shaft at a depth of 2,000 ft. has been renewed. This work, interrupted over three years ago, has progressed to a point about 4,500 ft. beyond the Ontario shaft and within about 125 ft. of the Daly-West end lines. The work will be pushed to completion and, by the end of this year, the tunnel will be draining the Daly-West mine and give an opportunity to mine the new sulphide ores at great depth. There are about 150 men now employed at the mill and mine, and the property is being put in shape for a large output of its silver-lead ores.

At the Columbus Cons. properties in Alta district some trouble is still experienced in raising the waters from the long drift from the 400 level. The pumps have twice been lost. As soon as a better idea of the water courses is obtained it is probable that the drain tunnel work will be taken up again. At the South Columbus a large tonnage of ore is blocked out, and regular shipments will be started some time in July.

A call has been sent out to the share-

holders of the American Flag Mining Co., to meet July 11, to consider the proposition of voting a bond issue to raise money to build a milling plant to reduce a large tonnage of \$15 to \$30 milling ores, blocked out in its Park City mine. The proposed bond issue is for an amount not to exceed \$150,000. The mine has been opened up to a depth of 1,100 ft. and since the Ontario drain tunnel has been reopened, it is said that the mine is drained.

At the Wabash properties in Park City ore is showing in the face of the long drift sent out from the working shaft, and the vein matter has been followed for several hundred feet. The upraise from the drift level is in some ore. The operations carried on at this time are at a depth of about 1,700 ft., and a number of crosscuts are being run to get the lay of the formation. Thirty men are employed.

The Utah Copper Co. reports the output during May as 4,182,529 lbs. of copper. Approximately 5,000 tons of ore are being mined and treated every 24 hours in the mills at Copperton and Garfield. General Manager Jackling states that the company will continue to increase its production until the full capacity of the two plants has been reached.

Jesse Knight, president of the new smelting company at Tintic, states that the lead furnaces will be blown in by the middle of July, and possibly as early as the 10th. The United States Co. hopes to have its smelter in commission at about the same time.

## WASHINGTON.

### Loomis.

Myers Creek district, about 12 miles square, lies in the northeast corner of Okanogan county, in the Okanogan highlands. Valuable ore deposits are being opened up on Copper mountain. A group of six claims just over the summit on the eastern side was sold to the Grant Cons. Mining Co. about 18 months ago. A short open cut and tunnel soon intersected a deposit of chalcocite ore from which 200 tons were shipped to the Granby smelter at Grand Forks, B. C., and gave returns of 65% copper and about \$1 in gold. On the strength of these returns the company decided to run a tunnel to intersect the ore deposit at a depth of 250 ft. Two 80-hp. boilers, an air compressor and other machinery were installed. The tunnel has been driven several hundred feet. Two large deposits of magnetic iron, one of them 47 ft. in width, have been intersected. The values in this ore are reported to run about \$12 to the ton. The Great Northern railroad's main line is but about four miles distant from the Grant, but the property must be reached by a 14-mile drive.

Within 40 miles four smelters can be reached over the Great Northern. Many other properties are being opened up on Copper mountain, and some of them are of the most promising character. West of Myers creek for 12 miles the surface rises by a series of benches to an elevation of 4,500 ft. Evidence of glacial ac-

tion are everywhere apparent. Placer gold is found in the valleys. Mines are being developed in many places in this mineral belt.

Near Chesaw the Butcher Boy property is being operated. A shaft down to 100 ft. revealed a widening ledge and increasing values. The ore first taken out was shipped to the Granby and returned approximately \$800 to the car of 30 tons. The ore vein has widened at the depth now attained from 12 ins. on the surface to 3 ft. A short tunnel has been driven to intersect the ore, making the mining comparatively easy. The ore now being shipped averages about \$1,200 to the car of 30 tons. John Benson is manager of the Butcher Boy and part owner.

Lying near the Butcher Boy is the Ben Harrison mine, equipped with concentrating mill of 50 tons capacity. This property has been under the supervision of Major J. P. Blaine for six years. The values found are principally in gold.

On the summit on west side, about three miles from Chesaw, and a like distance from the railroad, are the Mad River and Olenyung mining properties, the former of seven, the latter of four claims, all patented. The values are chiefly in gold and copper, although some fine veins of galena were shown. An iron capping on both properties, more than 100 ft. in width, carries values in gold and copper approximately \$4.

Underneath this iron capping the shaft on the Olenyung has passed through several leads, one 27 ft. thick carrying values above \$40 to the ton. A depth of 112 ft. has been reached by this shaft and a second is being sunk to 100 ft. A gas-belt hoist of 12 tons capacity and a 35-h. p. Ingersoll-Rand air compressor with power drills comprise the equipment. The mine is under the management of Dennis McCarthy, the original locator.

Farther west are the Allen placers operated by hydraulic machinery, the water being conveyed by flume from Tipple lake across the line in British Columbia. The Allen property comprises 16 claims, and numerous quartz veins have also been found.

Adjoining the Allen on the southwest is the property of the Molson Gold Mining Co., which embraces six claims. Within the past year an Elspass concentrating mill of 50 tons capacity has been installed, and is now in operation. The ore is chiefly free milling, and is reported to be running about \$12 to the ton. D. W. Dart is manager.

Many other properties of great promise lie in the Myers Creek district. Among them are the Bi-metallic, the Jumbo, the Rock, the Rainbow, the Tamarac, the Jack Pot, the Rainbow, the Monterey, the Kitchener, the Buckeye and many others. In all parts of the district mining is carried on economically on account of the natural advantages. Timber is abundant on the east side of Myers creek and much is found on the west side.

#### Republic

At the Syndicated Deep mines five men are extracting ore from the main stop above the bottom level of the Lone Pine workings of the Pearl Cons. group.

A carload of ore has been shipped from

the upper workings of the Republic mine, by the lessee, for the purpose of ascertaining the average value of ore in sight.

At the Copper Key mine on Belcher mountain more power has become necessary, and the gasoline engine will be replaced by a steam engine, which can be run cheaply, there being standing timber on the ground for fuel sufficient to last for many years. New discoveries have been made in the mine sufficient to warrant the change.

On the Lake group, on the Ferry county side of Kettle river, about six miles south of Orient, a new strike of iron sulphide ore assaying well in gold and copper has been made.

The Lone Star and Washington mine, in Ferry county, adjoining the international boundary, has been developed by the British Columbia Copper Co. to the extent that ore shipments may be relied on for an indefinite period. While the property has been comparatively idle for some time, during the financial troubles, the company will resume shipping without delay. A new strike recently reported is simply the continuation of one of the immense deposits of ore discovered during active development. The company will soon start work for a new tunnel from Gossomoos creek, about four or five miles distant from the Spokane & British Columbia railway.

A report that Oregon people had paid \$500,000 cash for the Mania mine has proved incorrect. These people, however, are interested in the Keller Smelting Co., and \$500 has been paid on an option for the purchase of this property. The Mania vein outcrops about 100 ft. wide, and has been opened by two crosscut tunnels and lateral workings, through which considerable copper and gold is found. A force of 19 men is employed building a 1-cw stretch of wagon road to the mine, to avoid the steep haul over the sand hills. Men will be put into the mine to break ore to be hauled to the smelter pending the construction of a tramway.

#### Orient

Work on the Trojan property near Orient is to be carried on this summer.

The 100-ton concentrator of the Spokane Lead Mines Co. has been started at Metahine and is doing good work. It is hoped that by July 1<sup>st</sup> the plant will be ready to handle ore to its full capacity. Other work is in progress, such as erecting bins, laying tram track, etc. The first few shipments of ore will be made by boat with wagon transfer around Box canyon on the Pend O'Reille, until the new steamer gets to running from Newport to Metahine, after which shipments will be direct to the Great Northern railway.

The Blue Jim Mining Co. has been organized by Spokane men to develop a group of five copper claims located across the river from Metahine. A bond has been taken on two additional claims. A drill compressor is to be installed, and development carried on.

It is reported that gold and copper has been encountered in the Orient mine, near Orient, in the bottom of a 60-ft. shaft. The vein is said to be 4 ft. wide.

From the First Thought mine about 35

or 19 tons of ore is still being shipped daily to the Northport smelter. Development is also being extended. There are a number of other mines on First Thought hill under development, and much money has been expended this season.

## CANADA.

### ONTARIO.

Cobalt.

Shipments from the camp for the week ending June 20 were 299 tons, making a total for the year to that date of 6,582 tons. The shipments were as follows:

	Week, June 20, Lbs.	Year, 1908, Lbs.
La Rome	194,476	2,225,400
O'Brien	128,120	2,001,880
Nipissing	235,880	2,059,290
Harris	65,470	654,470
Silver Queen	64,190	644,190
Donnison	57,480	574,480
Porter	178,400	178,400
McKinley-Barragh	60,000	1,563,200
Kerr Lake	155,120	155,120
King Edward (Wash.)	247,340	247,340
Temiskaming	271,545	271,545
Cobalt Central (Standard)	196,280	196,280
Silver Cliff	53,000	53,000
Silver Leaf	197,200	197,200
Cobalt Lake	247,340	247,340
Novia Scotia	271,545	271,545
Cobalt Township	82,720	82,720
Temiskaming & Hudson		
Key	515,920	515,920
Orinond	148,600	148,600
Crossed Robert	97,480	97,480
Plethway	65,470	1,128,170
City of Cobalt	145,940	145,940
Nancy Helen	128,440	128,440
Richt of Wagon	300,000	300,000
Provincial	151,680	151,680
Little Nipissing (Peterson Lake)	60,410	60,410

Very bad lush fires have been raging for the past few days in south Lorrain and southeast Coleman. It is impossible to tell yet all the damage done, but, as far as known, the Paterson, Columbus, Coleman Development, Lumsden, Shamrock, Cochrane and Wetkauffer properties have lost all their buildings and the Temiskaming, Beaver, Badger and Progress have sustained some losses.

The 12-drill compressor and 100-h. p. boiler recently installed at the Silver Queen are now in operation.

The diamond drill has cut the Kendall vein on the Nipissing at a depth of 49 ft., 300 ft. east of the shaft. Ore to the amount of \$500,000 has already been taken from this vein. Three hundred and two men are employed.

At the Harris pyrite mine at Rib lake, the shaft is down 174 ft. and will be continued to the 200 level. A station is being cut at the 150 level. The ore here is known to be 16 ft. in width and is probably much wider.

At the Stirling mine, near Temagami, the sinking of a 100-ft. shaft on the mispickel vein has been started.

The management of the Standard Cobalt mines, known as the Cobalt Central, is sinking two shafts. The main one is on the Big Pete property and the other on lot No. 38. The latter is down 35 ft. and is timbered nearly to the bottom. Water has been encountered in the main shaft which makes progress slow.

The St. Lawrence Cobalt Mining Co., owning an 18-acre island in Sasagama lake, has made application to the Provincial Government for land under water to complete a full claim. Prospect pits on

the island have disclosed ore bodies asaying well in silver.

A good ore body has been located in the No. 4 drift from the north crosscut at the 100 level on the Nancy Helen mine. Assays have shown very high values in silver. A new station has been cut at the 150-ft. point in the shaft and a cross-cut has been started. Sinking has been resumed and the shaft has reached a depth of 160 ft. A working force of 54 men working on two shifts is employed.

## BRITISH COLUMBIA.

### Phoenix.

Jay P. Graves, general manager of the Granby, states that the many improvements recently made about the mining and smelting plant of the Granby have cost over \$500,000. The mining company is realizing a profit, but in order to get this profit, after figuring operating expense and fixed charges, it is necessary to have every improvement that can be secured in order to cheapen the cost of production.

The tonnage of ore shipments from the Boundary mines for the week ending June 20 and for the year to date were:

	Week.	Year.
Granby .....	20,952	500,812
Mother Lode .....	8,689	25,883
Oro Denora .....	2,636	10,406
Sully .....	80	80
Crescent .....	20	20
Snowshoe .....	367	367

The receipts of the district smelters were:

	Tons.
Granby, Grand Forks .....	20,952
British Columbia Copper Co. ....	12,788

The converters at the British Columbia Copper Co. smelter at Greenwood are turning out a car of blister copper per day at the present time and it is expected that the output will be materially increased as soon as the new compressor at the Mother Lode mine is started up.

The following is a statement of operations at the British Columbia copper smelter during the fiscal year ended Nov. 30, 1907:

	Product.	Amount realized.
Refined copper (lbs.) .....	8,643,133	\$1,579,967
Silver (ozs.) .....	101,114	67,214
Gold (ozs.) .....	24,967	512,233
Total .....		\$2,159,414

The company received an average price of 17.52 cts. per lb. for its copper.

The British Columbia Copper Co. is receiving ore from the Napoleon and Lone Star mines, which it has acquired, and which are located across the boundary line in the state of Washington, near Marcus. No ore is being shipped from the holdings near Danville.

Work was resumed at the Dominion Copper Co.'s Brooklyn mine in Phoenix on June 22. The force put to work to begin with was small, but when running nicely 200 men will be employed at the mines and over 100 at the smelter at Boundary Falls.

### Rossland.

The gross value of the output of the Consolidated Mining & Smelting Co. of Canada, operating in Rossland and at Trail, Phoenix and Moyle, for nine months of the current fiscal year, which

ended June 30, is \$1,178,786, which is \$100,000 more than for the whole of the fiscal year 1907.

The following tonnage was shipped from the camp during the week ending June 20 and for the year to date:

	Week.	Year.
Centre Star .....	2,320	83,291
Le Roi .....	1,015	39,939
Le Roi 2 .....	915	12,584
Mayflower .....	35	35
Glant-Columbia .....	35	35
Blue Bird .....	110	110
Red Eagle .....	20	20
Evening Star .....	488	488

The receipts at Trail smelter were 5,549 tons of gold-copper and silver-lead ore and at the Le Roi smelter 1,171 tons of gold-copper ore.

A car of hand picked galena ore was shipped from the Mayflower during the week that is expected to bring the lessees of that property over \$1,000.

## MEXICO.

### Guadalajara.

The custom smelter of the Carrizo Copper Co. at Ayutla has been blown in and is now running at a capacity of about 90 tons daily. The operation of the smelter will be continued until the ore on hand is turned into matte, and then the plant will be shut down until fall. It is expected to blow in for continuous operation at the close of the present rainy season, probably in October. The blowing in of the smelter was witnessed by the directors and several other stockholders of the Carrizo Co. The plant is in charge of Albert L. Waters.

According to Charles C. Clapp, vice-president of the Lawson Mexican Co., who is now in Mexico, the plans of that company for mining and milling operations in Jalisco have been temporarily abandoned pending action on the proposed anti-foreign provisions of the new mining law. A few months ago Frank W. Page, general manager of the Lawson Co., secured options covering properties in Mascota district approximating in value \$165,000. At that time plans were made for the completion of the Lawson-Page custom plant on the San Geronimo hacienda; the development of the Mascota properties already owned and those to be purchased; the development of cinnabar deposits at El Moral; and the opening up of two big copper deposits near the town of Ahijulillo, in the southern part of this state. It was estimated that the development and equipment plans would necessitate an expenditure of fully \$500,000. Since that time some money has been paid to the owners of some properties under option, but practically all the deals are still pending. Now, according to Mr. Clapp, the options will have to be renewed or cancelled, unless President Diaz vetoes the anti-foreign measures at an early date.

The El Favor Mining Co. of New York expects to soon let a contract for the erection of a reduction plant at the El Favor mine in the Hostotipaquilillo district. The plant, as projected, will consist of 20 stamps, concentrators and a cyanide annex. The company now has a mill fund of \$125,000, and any additional capital needed can be secured.

E. J. Callahan of this city, acting in

conjunction with the El Favor Co., is negotiating with the San Pedro Analeco Mining Co. to take charge of the hydroelectric installation at the San Pedro Analeco dam on the Santiago river, and to furnish power to the San Pedro Analeco and El Favor properties. The machinery for the first unit of 500 h. p. is now at the dam. The installation of two other units of 500 h. p. each is contemplated.

### Oaxaca.

It has been confidently expected for the past month or six weeks that the work on the partially completed San Juan railroad, connecting Oaxaca and the Taviche camp, would be resumed. Last week the contracting parties met in this city to sign the final papers for the completion of the construction work, laying the steel and arrangement of equipment, but at the last moment a document, representing an unknown encumbrance, was brought into the meeting, and at least thirty days will be required in which to clear away the new difficulty. The importance of the completion of the road is great, as it will be impossible for the smelter to start before the road is in shape to handle ore, and no great activity can be expected in the state until the smelter begins work.

Much higher grade ore has been encountered in the Oaxaqueña mine, in the San Jose district. The shaft is being sunk from the 100 to the 200 level in vein matter. The work has been in ore since it was started, but the values were low. It is thought that the present shoot is a different one from the shoot on the first level, from which most of the rich ore has been taken thus far.

The San Francisco mine, in the Taviche district, is being rapidly and judiciously developed by the Tehuantepec Silver Mines Co., which recently purchased the property. The new tunnel, 300 ft. below the old one, is now in 60 meters. There are 125 men employed in the new works and all possible activity is being shown in getting the property in condition to add materially to Taviche's ore production.

An entirely new vein, which does not crop, has been accidentally encountered on the 525 level of the San Juan mine, in Taviche, while the station was being cut. The new vein is parallel to the vein which has been followed down from the surface and at the point where it has been opened, contains practically the same values as are being taken from the ore shoot in the old vein.

The tunnel on the Humboldt property, in the Ocotlan district, is now in 60 ft. This work was recently started to cut the vein at a level lower than the shaft and will not cut the vein for at least two months. Sinking is being continued in the vertical shaft.

An electric pump, one of the first to be set up in the camp, has been installed on the Boston, in Taviche.

The Santa Catarina Mining and Milling Co., operating in the Parian district, is running the mill on a large body of low-grade ore, which has been blocked out for some time. The cost of milling is low, owing to an abundance of water at this season and hullion to the amount of 1,300 to 1,800 pesos weekly is being saved.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The annual meeting of the Guggenheim Exploration Co. has been adjourned to Aug. 25.

The Imperial Mining Co. of Millan, Idaho, has voted to increase its capitalization from 1,000,000 to 1,500,000 shares.

The Tompah Mining Co. of Nevada has resumed the payment of quarterly dividends at the rate of 25 cents per share (\$250,000). The last dividend was paid in October, 1907.

The annual meeting of the Howard Copper Co. of Phillipsburg, Mont., will be held at 810 Equitable building, Baltimore, Md., June 24, at 11:30 a. m. L. Gibbons Smart is president.

Lewis & Severance, general agents of the Goldfield Tunnel & Mining Co., and Calumet & Nevada Cons. Mines Co., have removed to 305-6 Wright & Callender building, Fourth and Hill streets, Los Angeles, Cal.

The Mobile (Ala.) Portland Cement & Coal Co. has been incorporated in Maine with a capital of \$6,000,000. The company will start the construction of a 1,000,000 plant on the Gulf of Mexico at once. W. J. Oliver is president, and C. H. Treat, United States treasurer, a director.

The stockholders of the Dominion Iron & Steel Co. have authorized the issuance of \$5,000,000 of common stock and \$20,000,000 of consolidated bonds, the idea being to consolidate the present bond issue and take up the floating loan. This issue will also provide funds for needed improvements to the plant. The old board of directors has been re-elected.

The Pendleton-Gomer Mines Co., capitalized at \$1,000,000, and with property in the Russell Gulch district, Gilpin county, Colorado, has the following officers and directors: A. A. Johnson (president and general manager), James Ossewaarde (vice-president), Hugh D. Dunn (secretary-treasurer), H. L. Ritter (general attorney), C. A. King, James A. Johnson and C. C. Johnson. The headquarters are in Denver.

The directors of the United States Smelting, Refining & Mining Co. appointed the following executive committee on June 25: B. Preston Clark, K. D. Evans, A. F. Holden, C. G. Riche, W. G. Sharp, J. J. Storrow and S. W. Winslow. They also appointed Frederick Lyon assistant managing director of all the subsidiary companies except the United States Smelting & Refining Co., with headquarters at Kennett, Cal.

The New England Mercantile & Security Co., of Providence, R. I., has been appointed financial and transfer agents of the Belle Revenue Mining Co., with a property at Sheldonville, Wrentham, Mass. The Belle Revenue Mining Co., capitalized at \$250,000 in 10 shares has the following officers: President, Berton

F. Sheldon; treasurer, H. M. Daggett, Jr.; engineer in charge, Frank A. Clifford. The office is in Attleboro, Mass.

Charles H. Fish, president of the Ophir Silver Mining Co. on the Comstock lode, has issued a notice giving the miners a share of one-tenth of the net profits in excess of \$50,000 distributed every month. Similar notices have been posted by the Consolidated Virginia, Sierra Nevada, Union Cons., Mexican and Andes mining companies, with the exception that the latter named companies allow 10% over all net proceeds—omitting the \$50,000 clause.

## Official Reports.

### QUICKSILVER MINING CO., CALIFORNIA.

For the year ending April 30, 1908, the gross earnings were \$101,188, and after deducting expenses of \$38,023, there remained net earnings of \$163,165. Adding to this sum, appreciation in ore account of \$1,180, makes the net surplus \$7,345. Deducting \$2,150, for decrease in quicksilver in condensers, leaves a surplus net profit of \$5,195.

The cost of production was \$5,186 more per flask than in 1907, owing to larger tonnage and lower grade ore. The selling price increased \$17.25 per flask, but 908 less flasks were sold, amounting to a reduction of \$27,167 in quicksilver sales.

### HUBBARD-ELLIOTT COPPER MINES CO.

With the \$11,818 on hand Jan. 1, 1907, and the income for the whole of 1907 there was a total of \$179,134 to be disposed of. Deducting expenses of \$106,226, there remains cash of \$72,908. The disbursements were distributed as follows: Development of claims, \$15,518; patents, \$2,432; Knight's Island stock purchase, \$42,500; hydraulic account, Elliott Creek, \$2,377; new equipment, \$2,308; Elliott Creek railroad survey, \$17,964; salaries, \$7,083; provisions and supplies, \$3,981; freight and transportation, \$3,869; preliminary office and general expenses, taxes, insurance, etc., \$7,875; office furniture and fixtures, \$239; total, \$106,226.

### HORN SILVER MINING CO., UTAH.

During the calendar year 1907 there was mined 23,900,100 lbs. of first class crude ore, 4,092,310 lbs. first class zinc ore, 755,420 lbs. first class lease ore and 318,120 lbs. first class copper ore, a total of 29,605,950 lbs. Add to this quantity 602,295 lbs. ore extracted and waiting shipment, makes the grand total produced 29,728,245 lbs., which is 1,525,737 lbs. less than for 1906.

The metals produced in 1907 consisted of 3,583,554 lbs. of lead, 24,508 lbs. copper, 1,244,182 lbs. zinc, 206,337 ozs. silver and 284,196 ozs. gold.

The gross sales for the year were \$110,281, and miscellaneous income \$2,675;

total, \$112,956. Adding \$63,346 brought forward from last year makes a total of \$176,302. Deducting for mining, \$4,600; Cave lease royalties, \$3,233; taxes, etc., \$31,779; timber, supplies, etc., \$2,623; dividends, \$60,000, leaves a cash balance of \$23,565.

### BUTTE COALITION MINING CO., MONT.

The income for the year 1907 was as follows: Dividends received, \$1,320,000; interest, \$173,345; total, \$1,493,345. Expenses were \$11,880, leaving a net income of \$1,401,465. Deducting adjustments of \$5,098 leaves a sum of \$1,456,367. Dividends paid amounted to \$1,650,000. The total profit and loss surplus on Dec. 31, 1908, was \$6,960.

In 1907 the mines of the company produced 377,240 tons of ore, yielding 19,416,379 lbs. of fine copper, 444,809 ozs. silver and 2,480 ozs. gold.

Assets at the end of the year were: Investments in securities, \$11,000,000; cash, \$3,503,156; office furniture, etc., \$2,207; advances to other companies, \$97,439; total, \$15,012,802. Liabilities were: Capital stock, \$15,000; accounts payable, \$5,842; profit and loss surplus, \$6,960; total, \$15,012,802.

### MONONGAHEIA BUTTE CONS. C. & C. CO.

From Nov. 1, 1907, to April 30, 1908—six months—the coal output was 3,254,155 tons, and the net earnings \$110,480, an increase of \$30,061 as compared with the corresponding period in the previous fiscal year.

### ADVENTURE CONS. COPPER CO., MICH.

The financial condition of the company on May 31, 1908, was as follows: Cash and copper on hand, \$51,000; unpaid assessment, \$23,600; mines and supplies, \$12,000; cash at the mines, \$875; total, \$87,475. The only current liabilities consist of the mining expenses for May.

### TRIMOUNTAIN MINING CO., MICH.

The assets on May 1, 1908, were: Real estate, \$803,000; stock in Michigan Smelting Co., \$110,000; copper on hand and supplies at mine, \$334,218; cash and debts receivable, \$134,693; construction, \$1,823,864; total, \$3,205,775. Liabilities were: Capital stock, \$2,000,000; accounts payable, \$13,382; surplus, \$1,192,393; total, \$3,205,775.

### COSTA RICA ESPERANZA MINING CO.

The production from July 1, 1907, to April 30, 1908, was valued at \$437,438. Deducting expenses of \$131,548, leaves a profit of \$305,890.

### COPPER RANGE CONS. CO., MICH.

The assets on May 1, 1908, were: Bonds of Copper Range Railroad Co., \$615,000; shares in Baltic, Trimountain and Copper Range companies, \$96,939,160; shares in Copper Range Railroad Co., \$1,288,000; cash and debts receivable, \$1,027,024; shares (791) held for exchange for bonds of Baltic and Copper Range companies, \$79,100; total, \$4,050,124. Liabilities were: Capital stock, \$3,118,500; deposits from Copper Range and Trimountain companies, \$135,592; floating debt, \$1,100,000; profit and loss, \$40,122; total, \$4,050,124.



## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise.

(See also Market Reports)

[illegible]

### Latest Quotations on American and Foreign Mining Stocks.

Copper, Gold, Silver, Lead, Zinc, Oulcksilver

(\*) Dividend Payers. (†) Levy Assessments.

[illegible]







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Illustrated

## Metal Exports.

When general business at home is necessarily quiet, due partly to unsettled financial conditions such as have been experienced since last fall, or to a pending presidential election, or to other causes with economic influence, then producers—in this case the mining industry—learn the wisdom of seeking an outlet for their surplus stock other than the regular channel.

For a time domestic prices may be cut to encourage buying, but the wise producer or dealer in the commercial metals—silver, copper, lead, spelter, etc.—does not wait long to gamble away his profits on the possibility of reviving the home demand, but studies and works to increase his prestige in foreign markets. The result often is that the primary source of supply—the mine and incidentally the metallurgical works—may continue in operation, while less fortunate properties are compelled to close down.

Were it not for the fact that foreign countries, India especially, purchase the bulk of the world's supply of silver (of which the United States contributes about one-third), whether the metal is for hoarding, coining or use in the arts, many of the mines on the American continent would be shut down.

True, our government mints bought nearly 7,000,000 ozs. of silver during the first five months this year, and there have been purchases by silversmiths and others, but to a smaller degree than before the chill was given to prosperity by last October's money scare. By comparing domestic orders with those for export there is a wide margin in favor of the latter. As nearly as can be estimated the exports of silver from January to May inclusive amounted to 37,078,000 fine ozs., part of which was won from bullion, etc., imported from Mexico and Canada. The largest domestic supply comes from Colorado, Montana, Utah, Idaho and Nevada, and it is worthy of remark that an appreciable quantity of silver is obtained in smelting copper and other ores. The recovery of the precious metals at a profit will frequently meet the cost of producing the copper contained in the ore.

The exports of silver this year are surprisingly larger than for the early months of 1907, the result of the reduction in market price. The extreme quotations for the current year are 52 cents low, in May, and 56½ cents high, in January, making an average for the first six months of 53.002 cents per fine oz., as against 67.257 cents in 1907. The highest monthly average price this year was 56.011 cents, in February, and lowest 52.785 cents, in May.

Early in July there was a slight recov-

ery in the price of silver, due to the better situation of crops and finances in India.

Copper exports show a marked increase this year, which, by the way, have helped materially to reduce stocks that in future would have kept prices at low level. For the first five months the exports of copper, refined and metal contained in ore and matte, amounted to 139,463 long tons, which compares with 64,616 tons for the same period in 1907. Germany, France and Great Britain are the largest buyers. China this year received 6,127 tons of American copper, which is just that much more than was purchased in 1907.

Between the highest and lowest prices quoted for copper this year there is a difference of about 1½ cents per lb., rather small considering the dullness of the domestic market. Comparing current prices with those of a year ago, however, there is shown a falling off of about 10½ cents per lb. Quotations on July 8, this year, were: Lake, 12½ to 12½ cents per lb.; electrolytic, 12½ to 12½ cents; casting, 12½ to 12½ cents. For the first half this year the extreme monthly average prices were: Lake copper, 13.88 cents high, in January, and 12.81 cents low, in May, making a six months' average of 13.079 cents, which compares with 24.939 cents for the corresponding period in 1907. Electrolytic metal, 14 cents high, in January, and 12 cents low, in February, while the average for the first half of this year was 12.894 cents, as against 24.303 cents in 1907. Better prices are looked for during the closing months of the year.

Spelter and zinc ore have both shown expansion in exports this year. Of zinc ore there has been sent abroad 12,663 tons for the first five months this year, as against 8,071 tons in 1907; and of spelter, 3,114,027 lbs., against 609,335 lbs. in 1907. The zinc mining and smelting industries have suffered severely from the depression in domestic business and low prices, but the future will be brighter. The extreme quotations for spelter at New York this year are 4.85 cents per lb. high and 4.45 cents low, in February, while the average for the first half this year is 4.617 cents, as against 6.582 cents in 1907.

From 3.60 cents per lb. low, in January, the quotation on lead has gradually risen to 4.55 cents in June, making an average for the six months of 4 cents, as against 5.96 cents for the same period in 1907. Export trade has been small, 20,306 lbs. for the five months ending with May, as against 36,496 lbs. in 1907.

The export trade in quicksilver continues to fall off, owing partly to the

lighter demand from China and Mexico. During the first five months this year the exports totaled only 83,884 lbs., as against 233,338 lbs. in 1907. Fortunately for producers prices today are somewhat better than a year ago, although recently a reduction was made. At \$43.50 per flask of 7½ lbs., f. o. b. New York, there is a fair profit for producers.

Other exports for the first five months this year included: Nickel as metal, oxide and matte, 4,504,974 lbs. (produced mainly in Canada); and aluminum, \$162,681.

One of the more gratifying features of the export trade in the commercial metals is the assistance it has rendered to a number of mines and ore treatment works to continue in the dividend list.

### Studying Coal Mine Explosions.

The United States government, within the next few weeks, will begin a series of scientific investigations into the causes of disasters in American coal mines in the hope that the present frightful mortality may be reduced to a minimum. By August 1, in accordance with plans approved by Secretary of the Interior Garfield the United States Geological Survey will have a complete experimental station in operation on the grounds of the Arsenal in Pittsburgh, Pa.

For some time before the Hemenway amendment to the legislative appropriation bill, making an appropriation of \$150,000 for this work, became a law and the money available, Survey officials were busy making tentative plans for the station in order that there might be no delay. This advanced the project to such an extent that it is expected the station will be in operation about August 1.

This prompt action was considered necessary by reason of the fact that the terrible mortality record of last year is being continued, although 1907 was considered unusual, 3,209 being killed in the coal mines as against 2,061 in 1906. From unofficial estimates it appears that 76 men have been killed or injured each work-day of the year. A short time ago, 23 miners were killed and 30 injured in and about Wilkes-Barre, Pa.

At the Pittsburgh experimental station, tests of the various dynamites and powders used in blasting coal will be made with a view to accurately determining their safety in the presence of the deadly firedamp and equally deadly coal dust. Explosives of all sorts will be hurled by means of a mortar into a mammoth cylinder which has previously been filled with gas, and the effects will be noted. If ignition fails after severe tests, the use of these explosives will be urged upon mine owners.

That part of the experimental station in which the explosives are to be tested will be in the form of a cylinder, 100 ft. long and 6 ft. in diameter, lying on the ground. An explosive mixture of firedamp and air in one case, or coal dust and air in another, will be pumped into the cylinder and the explosive to be tested will be shot into it from one end by a big steel mortar, so that the flame and products of combustion will go right into the explosives.

Pittsburg was selected as the site for the station because the government is already in possession of available land and buildings there; but this site is especially favorable because it is in the heart of the eastern coal fields, and in the state where 1,744 men lost their lives in the coal mines in 1907 (nearly half the total for the entire United States). It is also an advantage to have natural gas easily obtainable as this gas corresponds nearer to firedamp than any other.

The cylinder in which the explosions are to occur is to be made of heavy boiler plate. Safety valves will be placed all along the top and will be left unfastened in such a manner that whenever there is an explosion the valves will fly open upon their hinges. A series of port holes on the sides, covered with ½-in. glass, will enable those conducting the experiments to witness the explosions from the observation house 60 ft. away. The steel mortar, which will hurl the explosives into the cylinder, will be fired by electricity from the observation house which is to be parallel with the cylinder itself.

While these tests are being conducted, operators and miners will be invited to be present. In order that they will be able to see clearly the explosions of gas or dust, a piece of oil paper will be placed across the face of one of the safety valves with a piece of gun cotton suspended about 6 ins. away. When an explosion occurs, the flames will burn the oil paper and ignite the gun cotton.

In connection with the experimental station there will be a miniature mine with drifts, headings, rooms and ladders. This place will be filled with smoke or gas and experiments will be made with apparatus capable of sustaining life in these vapors. Miners will be taught how to wear this apparatus and how to save their comrades who may be unconscious in the mine following an explosion.

It is believed that with some such apparatus in use last December when 800 men were killed in four mine explosions, a number of the victims of these disasters might have been saved had they been reached in time. As it is now, following an explosion, with the mine filled with

poisonous vapors, no one will venture in the mine for some time after the accident. A sad illustration of this is seen in the explosion at Hanna, Wyo., March 28, in which 70 miners were killed. No one has yet entered the mine, the bodies being still there.

The experimental work will be directed by Joseph A. Holmes, expert in charge of the Technologic branch of the United States Geological Survey, assisted by H. M. Wilson, chief engineer. The investigations will be conducted by a trained mining engineer experienced in such work. The station itself will be in charge of Clarence Hall, the government explosive expert, with Dr. Walter O. Snelling as explosives chemist.

There is no intention of interfering in any way with the inspection work of the state bureaus. The work is wholly investigative in character and educational in purpose.

### Pay in Government Service.

On another page will be found an earnest plea for adequate appropriations by Congress to carry on the good work that has been planned by the United States Geological Survey. The director of the Survey, Dr. George Otis Smith, has written in reply to our request for an expression of his opinion based on an editorial which appeared in *The Mining World* for June 27 last.

The subject is worthy of careful discussion, and the greater the publicity, we believe, the nearer will be the time when our legislators at Washington shall better appreciate the necessity for making more satisfactory appropriations, not only for technologic investigations and regular field work, but for salaries also.

Unless the government recognizes the fact that the able men in the Survey are worth much more money than is now paid them, it cannot reasonably be expected that they will continue in its employ. In private practice there are many better paid men with less responsibility and perhaps less experience who would hesitate to enlist in the government service, even though there is a chance to make a reputation.

We regret to say that advancement in the Survey is as slow as it is in the navy, and that some of the best geologists have found it more advantageous to work for private corporations. It is due to the director of the Survey who has been in harness only a short time, as well as to the mining industry as a whole, that salaries of officials and subordinates should be sufficiently high to make it an inducement for them to continue in the government service. And it should not require much lobbying either to make our legislators see the equity of the cause.

# Recovering Diamonds From the Far North.

By ALEX GRAY.

So many at intervals have reported the finding of diamonds in North America, in the peridotite south of Mason and Dixon line, in a creek or two in Kentucky, down in Arkansas and up in Wisconsin—all to little purpose—it is not surprising that the latest announcement of a "parcel" recovered from Northern Quebec receives less credence in official, mining and lay circles. A newspaper or two at Toronto and New York vouch for the authenticity of the discovery, place the number of diamonds exhibited by an intrepid Scot, named MacKenzie, at 1,000, describe the gems as of excellent quality, and attest that these represent the result of two summer's work.

Exactitude is not manifest as to the district. An Indian guide accompanied MacKenzie to somewhere between lakes Mattagami and Shabogama, and diligence and perseverance are alleged to have disclosed a diamondiferous area, 20 miles in extent, precious stones being noted in "pockets."

MacKenzie and his Indian were tracked, it is claimed, by envious rivals, and managed to elude their pursuers. They succeeded in evading molestation

*Reported discovery of diamonds in northern Quebec. Prospecting handicapped by frozen ground, due to nine months of winter.*

*The Vaal river "diggings," and speculation in shares. Geology of diamond deposits. Uncertainty of success in mining.*

owners have not taken the trouble to ascertain, being content to sell shares instead of providing a small washing plant, and to assure prospective purchasers that stones are known to have found years ago.

In Arkansas, farther west on the line

pation than sieving and sorting gravels, where the climate is a benediction in itself, and cornmeal tastes as good as chicken when the "finds" are insufficient for table luxuries. To gamble from day to day on the toss of the hand sieve—rotary pans only being within the reach of the more fortunate and thrifty "diggers"—has the flavor about it of Monte Carlo, Virginia City and Leadville in the '70s.

Sludge knee deep is no discomfort, and mud solutions from the Vaal are nectars to men who subject themselves to what they regard as exhilarating privations.

It might not be so salubriously unpleasant between Lake Mistassini and James bay on the confines of Ungava, and unless there is something besides "pockets" and "blue clay," those who fancy diamond mines should be located



Where Diamonds Were First Found on Vaal River.

of any kind as they desired to thoroughly explore the country before acquiring ground from the government; and the fact that officials profess ignorance of MacKenzie or his movements shows that the northland is at least admirably adapted for secrecy.

The superintendent of mines of Quebec made two flying surveys near the region during the summers of 1906 and 1907. He has published a review of those trips, and commented in detail upon what he saw and heard, but nowhere has there been a hint conveyed to him, or any one operating there, that mysterious strangers were washing "blue clay" and obtaining precious stones of purity approaching those of the Vaal river "diggings" from Christiana to Sivonell—the most romantic and remorseful district in South Africa.

It follows that Canada is skeptical in the absence of ocular demonstration. The doubt may or may not be well founded, because few will acknowledge the existence of a defined diamond mine, south of the Ohio, containing all of the minerals associated with diamonds at Kimberley. Whether there are diamonds the



Breakwater and Paddock in Vaal River.

of igneous activity, the diamond bearing section created a furor a year back.

Canada is indisposed to entertain the story emanating from Toronto, published in New York, and instead of a rush to the southern shores of Hudson bay, the public await confirmation rather than go canoeing where the best prospects would be unpayable unless there was better mining than other such fields had in their initial stages.

Frozen ground and nine months of winter do not permit of prospecting by the mile, and "pockets," unless they are more numerous than at the Vaal river or in Brazil, might mean a very precious livelihood for "diggers."

All alluvial diamond "diggings" have yet to enrich other than the few fortunate enough to alight upon a local enrichment, either in the beds of the rivers, on the terraces, or the flats in the vicinity once traversed by flood waters. There is no more interestingly haphazard occur-

near remote extinct craters of the frozen northland will be content to cherish that fancy rather than risk it.

An argument to be advanced by the venturesome optimist no doubt will be that Klondike and Yinkon placers having been exceptional in their average gold contents, northwestern Quebec alluvial diamond areas may be equally so. This presupposes sources as prolific in diamonds as those from which the alluvial gold was eroded, a hypothesis that practically disproves itself, since all craters are not diamondiferous, and the volcanic "pipe" that does carry diamonds in its magma is the variety that adds the precious factor to the gems.

Nor are diamonds likely to be remunerative where these are so elusive. In this instance they are reported to exist in "blue clay," which cannot be construed as "blue ground"—the volcanic "plum pudding" of Sir William Crookes,—because if it is at surface it would be

weathered, and what is known as "yellow" in reality decomposed "blue." Twenty miles of "pipe" matter would put the De Beers-Premier-Vorspoed mines out of business, provided the diamonds were sufficiently disseminated to permit of bulk treatment of ground without selection.

However, as the "blue clay" may mark

ence between Droogeveld and the other "diggings" of 30 years, an aggregation of poverty gulches with occasional "pockets."

Now the individual has been restored to his avocation. He is a mining nomad, working a claim here and there, his worldly belongings not being "immovable" within the meaning of any statutes.

his report for 1907 makes no allusion to the discovery, and classifies the district with Louder lake, just over the line in Ontario. Mr. Brock, acting chief of the Dominion Geological Survey, and Mr. Ohalski, speaking for Quebec, are agreed on the rocks in evidence as belonging to the Keewatin series, mostly a "mélange of quartz and green schists." At the same time, there were rumors a year or so ago about diamonds being found near Hudson bay toward which the country falls from Shabogama and the height of land to Mattagami and the valley of the Nottaway river emptying into James bay. If contours count for anything, the diamonds would travel from the south. How far they traveled, the associated minerals may tell. How many of them "made the trip" is left to the superior discretion of prospectus writers and prospectors.



Preparing to Pump Out River so Diggers Can Work.

the course of an old river bed or a glacier, these northern Quebec diamonds could not very well be elsewhere than in "pockets," and as trickily distributed as they are in the other fields. Wherever alluvial diamonds are located, and it has been undertaken to treat the gravels in bulk after removing the overburden, and put these down to bedrock through machines without discrimination, the attempt has been abortive as to profits. London realizes this to its sorrow, having taken it for granted 18 months ago that thousands of acres on Droogeveld, near Sidney, on the Vaal would be worth from \$2 to \$3 per load of 16 cu. ft.

Test pits led owners to suppose that washing results would sustain extravagant estimates of responsible managers. Shares previously unsalable at \$2 went to \$90, and it was the painful duty of the writer, acting in behalf of London financiers, to burst the bubble. Today those shares are where they started, and the "diggings" are accounting for about the same number of diamonds they were prior to the excitement—\$15,000 worth per month.

Mining men forgetful of geology and static principles, and disregarding their own experiences along the Vaal or at Kimberley, floated syndicates and companies with greater abandon than Colalt thought of. The parent company's shares were valued in Throgmorton street at \$12,000,000, and various syndicates and companies leasing claims at half as much more, when the truth had to be told them, that there was no differ-

ence between Droogeveld and the other "diggings" of 30 years, an aggregation of poverty gulches with occasional "pockets."

One thing about these stories of diamonds from the other side of the "height



Typical River Digger's Claim Near Kimberley.

of land," over the watershed, where the waters flow into James bay of Hudson bay; they will not be easily disproved. Traders and trappers, Indians and a half dozen prospecting parties have the country to themselves all the way and beyond the line of the Transcontinental railway.

The Quebec superintendent of mines in

### Open-Cut Mining in Alaska.

In describing open-cut mining in the Fairbanks region of Alaska, L. M. Prindle, geologist of the United States Geological Survey, says that the ground is generally stripped first of all by sluicing off the overlying muck. A bed rock drain is then constructed, and an open cut of sufficient width for one or two sets of boxes is carried gradually up the valley.

In some cases the gravel is hoisted by steam power entirely out of the cut of boxes set above the surface and to one side of the workings. By this method a frequent resetting of the boxes is avoided and there is a better disposal of tailings.

Gravel is hoisted by derrick, by automatic trolley, or by a rock pump. Where the last method is used a set of boxes is placed on the bottom of the cut, the coarsest pieces are forked out, and all the rest of the material is elevated

through the pump to the boxes on the surface.

Owing to the depth of the gravels the open-cut method and its modifications are of limited application.

Ceylon exported 1,000 lbs. of thorianite, valued at \$1,541, in 1907.

# Mining and Milling Methods at Granby, Missouri

By EVANS W. BUSKETT,

Metallurgical Engineer.

Granby is one of the oldest mining camps in Missouri. It is located in Newton county, 302 miles southwest of St. Louis, on the main line of the St. Louis & San Francisco railroad.

Lead was discovered in section 6, in 1849, by Madison Vickery, who settled on that section in 1851. In 1849 he commenced prospecting on a spot where no grass grew and discovered some very heavy rocks which were afterwards found to be carbonate of lead. Encouraged by this showing he sunk deeper, in 1859, and discovered galena. There were, however, no furnaces near so he abandoned mining.

In 1852 this section became a part of the land grant of the Atlantic & Pacific railroad. In 1854 an Englishman named Foster extracted a considerable quantity of lead ore, and goes into history as the first

*Discovery of lead and zinc. Early furnace practice. During Civil War bullets made from Granby lead for Confederate army. Organization of Granby Mining and Smelting Co.*

*Unique method of acquiring and working mineral land. System of payment for ore. Equipment and operation of mill. Blake crusher. Hartz jig.*

considered of no value. He stated that black jack was a zinc ore and advised that it be saved. He was laughed at by the miners, but Henry T. Blow read the

The company works no mines, but operates a mill for the cleaning of ore, and a lead smelter at Granby. The zinc smelter of the company is located at Neodesha, Kans., in the gas fields.

## MINING.

The system in vogue is unique. A miner desiring to work on the Granby land does not have to have a cent. He first picks out a place to mine. Then he goes to the superintendent and states his desire to register. If he is a reliable man he is allowed to register. This gives him a lease for one year. If, in the superintendent's judgment he is able to take care of it, he is allowed more than one lot. The lots are 200 ft. square.

The miner is required to sink a shaft 4 by 6, and to keep it in good condition. He must also work continuously, but may be excused on account of sickness or unavoidable accident. The company pays him \$1 per ft. for every foot of shaft sunk and timbered. The company will also furnish machinery to pump and hoist the ore, free of charge, and will credit the miner with coal to run it. This charge is paid when the miner strikes ore, being taken out gradually so as not to work a hardship on him.

If the miner does not strike ore he still has his \$1 per ft. and owes the company nothing as it takes all the financial chances. The miner loses only part of his time. If he strikes ore he is obligated to sell it to the Granby Co.

The first part of each week the company ascertains the price of lead and zinc ores in the open market. These prices are posted not later than Wednesday of each week and the miner is paid at these rates for his ores when delivered. Nearly all mining in southwest Missouri is done on a leasing system, the miner paying a royalty of from 10 to 35% on the selling price of his ore. He is, however, compelled to furnish his own machinery for pumping and is often obligated to build a mill in order to hold his lease.

The Granby miner has the advantage



View of Granby Mining & Smelting Co.'s Property.

successful Granby miner, although nothing is known of the disposal he made of the ore.

About this time three Scotch hearth furnaces were erected on Shoal river by Fitzgerald and were operated for several years. The mines gradually opened up and a furnace was erected by John Plummer and another by Long. The product of these furnaces was hauled in wagons to Boonville, Mo., and Fort Smith, Ark., from which points it was floated down the Missouri and Arkansas rivers to St. Louis and New Orleans.

In 1857 Blow and Kennett obtained a lease on the Granby section from the Atlantic & Pacific Railroad Co., and erected furnaces on the land.

In 1861 the war caused a suspension of mining, and the only metal produced was that smelted by the Confederate forces for the manufacture of bullets.

The Granby Mining & Smelting Co. was organized in 1865, and took over the interests of Blow and Kennett, making Henry T. Blow president. This company has steadily increased its holdings until it now owns and controls thousands of acres of the richest mining land in southwest Missouri.

In September, 1868, W. S. Mesplay in an article on mining called attention to the black jack which was at that time

article and was interested. He had a large sample shipped to St. Louis and tested. It was found to be a rich ore of zinc, and in a few years the despised black jack became an important product of southwest Missouri.

The Granby Mining & Smelting Co. operates entirely on a leasing system.



Interior of Granby, Mo., Concentrating Mill.

of other miners in the district, in that he does not have to install any machinery.

#### MILLING.

In the Granby mill the ore is cleaned by the rougher and cleaner system which is in general use in southwest Missouri. This mill differs from the general practice, however, in that the ore is subjected to a closer sizing than is usual before jigging.

The ore from the bins is fed into a Blake pattern crusher, which discharges into an elevator. The crushing is done wet, a stream of water being fed into the crusher with the ore. After leaving the crusher, the ore is elevated and discharged into a 15 mm. trommel. The

mm. and 10 mm. goes to two 7-mesh 4-cell Hartz jigs.

The discharge from the 2 mm. trommel passes into a classifier, the coarse going to a 12-mesh 4-cell eccentric jig, while the finer material goes to a second classifier. This classifier makes three sizes: a 1 mm. size, which goes to a 12-mesh 4-cell eccentric jig; 0.5 mm., which enters another 12-mesh 4-cell eccentric jig, and a slime, which goes to a 15-mesh 3-cell eccentric jig.

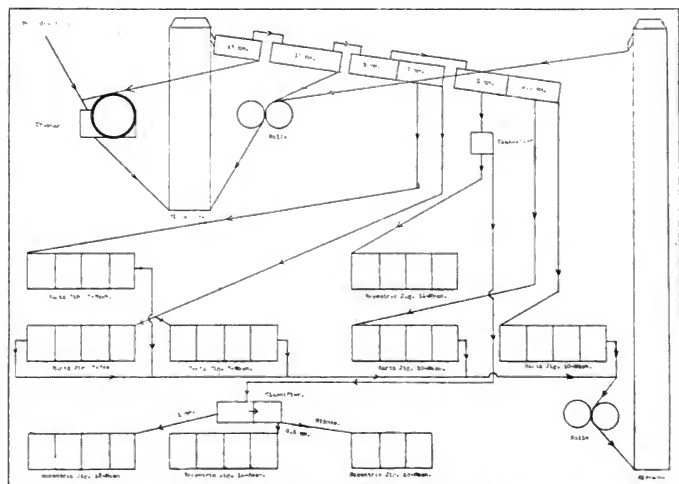
The discharge from the 3.5 mm. trommel goes to a 10-mesh 4-cell eccentric Hartz jig while the oversize, which is between 3.5 mm. and 5 mm., goes to a 10-mesh 4-cell Hartz jig.

All of the 2 mm. ore is cleaned at once

The company also has a mill for the concentration of lead ores, but it is not in operation at the present time, as most of the lead ore is cleaned at the mines.

In this lead mill there is some interesting old machinery. There is a Blake pattern crusher about 25 years old. It was made by Robinson & Rea of Pittsburgh, Pa. It is in excellent condition and is good for 25 years' more service.

There is a pair of rolls which must be at least 50 years old. These rolls are said to have been in use during the war by the Confederate government for the concentration of lead ores for making bullets. Originally they had no spring, but were compressed by weights hung on the ends of long levers. The sockets which



Flow-sheet of Granby Mining & Smelting Co.'s Concentrating Mill.

oversize from this trommel is discharged back into the crusher for recrushing from which it passes again into the elevator and on to the 15 mm. screen. The undersize from the 15 mm. screen passes into a 10 mm. trommel, the oversize from which is discharged into a set of rolls. These rolls discharge into the same elevator as the crusher and all of the ore passes through this system until it is fine enough to pass the 10 mm. screen.

The discharge from the 10 mm. screen passes into a 5 mm. and 7 mm. trommel. The 5 mm. discharge goes to a 2 mm. and 3.5 mm. trommel. The 7 mm. discharge passes to a 7-mesh 4-cell Hartz jig. The oversize, which is between 7

on the respective jigs. The 7-mesh jigs and 10-mesh jigs make some clean ore and chads, which are transferred by wheelbarrow to the chat rolls. These rolls discharge into an elevator which discharges into the first set of rolls. The ore in this manner is crushed fine enough for economical separation on the fine jigs.

Conditions exist in this mill that are peculiar to the treatment of this particular ore. One 4-cell jig often makes four products, a galena concentrate carrying 80% lead, a clean blende concentrate carrying as high as 80% zinc, a mixture of blende and silicate of zinc, and a clean silicate of zinc concentrate carrying about 40% zinc.

held the levers are still on the machine. Although this old machine is capable of doing good work it is not in use at present, but is kept by the company as a relic. If it is ever needed again, however, this old machine will stand up against as much work as some of the more modern types.

Pyrite imports into Great Britain for the first five months this year amounted to 366,182 tons, containing approximately 172,096 tons of sulphur. The imports of pyrites for the same period last year were 342,052 tons, containing 160,764 tons of sulphur. Most of the imports were from Spain.

# Asbestos: Its Occurrence and Economic Value.

By J. S. DILLER,\*

Geologist.

The United States is the largest manufacturer and consumer of asbestos products in the world, but the asbestos used in its factories comes almost wholly from Canada. The quantity of asbestos mined in the United States is insignificant. The total output for 1907 was only 653 short tons—the smallest since 1896. The cause of this decline is found in the better quality and the greater abundance and accessibility of the Canadian asbestos, which completely dominates the industry of the United States.

The most general characteristics of asbestos and the ones on which its utility depend are its fibrous structure and its incombustibility, but all the varieties are not equally resistant to heat nor do they possess equal quantity of fiber. The asbestos of commerce includes fibrous minerals of different species, most of which belong to the amphibole group, but the most important mineral is chrysotile, a variety of serpentine.

Amphibole asbestos is generally dull, varies in color from greenish to gray and white, and, though flexible for the most part, has a considerable degree of brittleness. It occurs in ancient crystalline rocks that have been crushed and sheared under great pressure in the process of mountain building, and it appears in three forms. Two of these forms, slip fiber and cross fiber, are veins, and the third is found in large fibrous masses, generally made up of small bunches of asbestos which are more or less divergent and sometimes distinctly radial. For convenience in distinguishing the latter form from the vein fiber (slip fiber and cross fiber), the designation "mass fiber" is proposed for it.

In veins of slip fiber asbestos the fiber lies parallel to the vein walls and marks a plane of fracture along which the two sides have slipped upon each other and given direction to the development of the fiber. Cross fiber asbestos extends directly across the vein which it forms. The mass fiber is not in veins, but forms the whole mass of the rock, in which veins of slip or cross fiber may occur. As a matter of fact, however, where mass fiber is best developed veins of slip fiber and cross fiber are rare or entirely absent.

Chrysotile asbestos is for the most part green, rarely yellowish, and the fiber of good quality has a silky luster and sufficient toughness to give considerable tensile strength, so that it can be spun and woven. It is generally, if not always, associated with massive serpentine, in which its most important form is small cross fiber veins varying from a mere film to a few inches in thickness, though in some localities there is much slip fiber chrysotile scattered in thin sheets throughout the rock.

The fibers of chrysotile in their original position extend directly across the vein, but subsequent rock movements may make

*Varieties and characteristics of asbestos. History and development of the industry. Method of mining and preparing the product for market. One pound of asbestos can be spun into 32,000 ft. of thread.*

*Large Canadian mines owned in the United States. Production, imports, exports and prices.*

them appear to pass into slip fiber, as at East Broughton, Canada.

The sporadic use of asbestos can be traced back into ancient times, but it was not until 40 years ago that investigations began in Europe to develop its application upon a commercial scale. About the same time specimens of the fine Canadian asbestos were exhibited abroad, and, in 1878, 50 tons were shipped from Canada to England. Soon after this discovery of an enduring source of supply in Canada the advances in the application of asbestos in commerce became rapid.

The method of mining was at first crude quarrying and hand picking, the best material only being selected. A great deal of short fiber remained in the waste rock of the dump. With the increasing demand came competition, for Russia and Italy soon entered the list of producers. To meet the requirements of economy it became necessary to devise special machinery which would increase the output, reduce the expense of labor, and effect a better saving of values in lower grades and byproducts.

There has been an extended investigation, and great ingenuity has been shown in developing the machinery of the large modern mills, of which there are now nearly a score in connection with the asbestos mines of Canada.

Breaking the rock and picking out the fibrous pieces (Nos. 1 and 2 crude, according to length) is generally called "cobbing," and should be considered a part of the mining process before the rock goes to the mill. The mills differ widely in their machinery, each being suited to the special conditions it has to meet; but the majority of them contain one or more forms of rock breakers for the preliminary crushing of the rock.

For the final crushing rolls and fiberizers are used, and of the latter the Cyclone, now so generally employed, must be considered one of the chief appliances in separating the asbestos and preparing it for the pneumatic processes, of which the screens, fans, and settling chambers are important parts.

It should be noted, however, that in one of the large mills recently erected at Black Lake, Canada, the Cyclone pulverizer is entirely replaced by a series of coarse and fine rolls. Several other plants in Canada have heretofore attempted to discontinue the use of the Cyclone, but

most of them have taken it up again. In some mills the tailings are ground to fine powder in pulverizers.

The development of the asbestos industry, as far as mining and milling are concerned, is wholly Canadian, but when we consider the manufactured products the United States is in advance of all other countries.

The relatively great importance of the industry to the United States results directly from the fact that a number of the largest Canadian mines are owned in the United States and that several of the owners have factories in this country. The Keasbey & Mattison Co., owning the Bell Asbestos Co. mines at Thetford, Canada, has several large factories at Ambler, Pa. The H. W. Johns-Manville Co., whose mines are near Danville, Canada, has large factories at Brooklyn, N. Y., Milwaukee, and West Milwaukee, in Wisconsin.

The mine which up to the present time is reported to have produced more asbestos than any other is that of the King Bros. at Thetford, controlled by a company of which R. H. Martin, of New York, is president. The Beaver Asbestos Co., with a mine near Thetford, is under the same management. But these companies, the Dominion Asbestos Co., the Manhattan Asbestos Co., and several others, all of which are said to be controlled by American capital, are not known to be manufacturers in the United States, though the bulk of the raw material from most of their mines comes to this country.

Raw asbestos is imported free into the United States, while there is a duty of 25% on imported manufactured asbestos. In Canada all the large mines are reported as paying an annual license of \$500.

The fundamental property of asbestos, upon which its use depends, is its flexible, fibrous structure, but coupled with this are the scarcely less important qualities of incombustibility and slow conduction of heat and electricity when the mass is fiberized, and porous, which make it valuable not only for fireproofing, but for insulating against heat and electricity.

It was first used only for spinning and weaving, to make incombustible thread, yarn, rope, and cloth, and this use has continued to be the most important application ever since the days of the Greeks and Romans. Only the highest grades of asbestos—Nos. 1 and 2 crude, with best grade from the mills—can be used for this purpose. Thread can now be spun so fine that it will run about 32,000 ft. to the pound. The cloth is extensively employed for making theater curtains and for other fireproof and insulating uses. Asbestos has been widely used of late in the electrical arts as a basis of insulation which must withstand somewhat elevated temperatures, and also as a fibrous binder for a great number of insulating compositions. It has a fiber, practically the only one, which is of a refractory nature, and is at the same time an electrical insulator of high order.

Further, asbestos is not affected chem-

\*Extract from Mineral Resources of U. S. for 1907.



ically by many of the active chemical agents likely to attack most insulations. It is extensively used for boiler and pipe coverings, to prevent heat radiation, and its efficiency is greatly increased by developing the cellular structure of the covering. It may be rendered more efficient, too, by a composition in which the asbestos acts as a binder for some good non-conductor. There are many patents concerning mixtures of asbestos with various compounds to produce incombustible and insulating pastes and moldable or solid material suited to many different purposes. They play an important part in many fireproof constructions where electricity and heat are used. Such materials are asbestos building lumber, century shingles, asbestos wood, asbestos slate, asbestos for stucco and plaster, and asbestos cloth.

A mass of asbestos broken into fibers and then again compressed is highly porous; but it may be rendered not only waterproof, but an especially effective insulator under conditions of varying moisture, by being saturated with certain varieties of asphalt.

As a non-conductor of heat it is used not only in the preparation of fireproof safes and vaults, but also for cold storage and cooling structures. Houses made of asbestos materials or coated with asbestos throughout are not only warmer in winter, but cooler in summer.

The United States in 1906 produced 1,685 short tons of asbestos, but in 1907 the output decreased to 653 tons, a decline of over 61%. The value of the asbestos (in part estimated) in 1907 was \$11,890.

Nearly all of this output came from the Sall Mountain and Hollywood mines in Georgia, which is the only state that furnished asbestos for the market in 1907, and nearly half of the quantity produced was exported. The asbestos mined in Georgia is all of the amphibole variety.

The imports in 1907 are: Unmanufactured, \$1,104,169, against \$1,019,454 in 1906; manufactured, \$260,371, against \$85,716 in 1906; total, \$1,316,579 in 1907, against \$1,076,170 in 1906.

The production in the United States is now only about 1% of that of Canada, and its insignificance becomes more pronounced when the grade of the material is considered. The asbestos mined in the United States is almost wholly of the amphibole type and cannot be used for spinning and weaving like the high-grade chrysotile of Canada.

Of the imported unmanufactured asbestos practically all comes from Canada. As to the manufactured asbestos, however, the reverse is true; only a small quantity comes from Canada, and of the rest, over 75% comes from the United Kingdom.

Except a slight falling off in 1902 and 1903 the increase in the Canadian production has been rapid and still continues. In 1907 it reached a total of 62,918 short tons, valued at \$2,482,984, besides 25,519 tons of asbestos, valued at \$22,659.

During the fiscal year ending June 30, 1907, there were 45,541 tons of unmanufactured asbestos imported from Canada into the United States. This would seem to show that approximately 73% (valued at about \$1,812,578) of the total production of Canada in 1907 came to the United

States. During the same period the total importations of asbestos from Germany, Italy, and the United Kingdom—the only other countries from which asbestos was obtained—aggregated only \$1,646 in value.

More than a year ago it was estimated that Canada produced 85% of the world's supply of asbestos. In 1907, owing to the large increase in the production of Canada, that country doubtless contributed a still larger percentage of the total yield of the world, and its controlling position in the asbestos industry is apparent.

Twelve companies were reported as producing asbestos in Canada in 1907, and four new ones are making extensive preparations for production in 1908, so that a much larger yield may be expected for 1908.

In the amphibole asbestos trade in the United States there was a decline of about 10% in 1907, though the price ranged about \$18 per ton, a figure somewhat higher than that for 1906.

The demand for the best grades of chrysotile asbestos has kept ahead of the supply. Some of the manufacturers report that the best grades cannot be bought in the open market, and that the high prices have a tendency to restrain the progress of the industry. The range of prices for the various grades reported by a number of firms is as follows, per ton: No. 1 crude asbestos, \$275 to \$350; No. 2 crude asbestos, \$150 to \$200; asbestos fiber (according to grading), \$25 to \$150; fines (according to grading), \$10 to \$25.

The special features of interest regarding the industry in Canada during 1907 were increased output, higher prices, and further consolidation of mining interests.

### Manufacture of Ferro-Chromium.

Prof. Roland Calberta recently stated before the New York section of the Society of Chemical Industry that a series of experiments had been carried out with a view to producing ferrochromium in an electric furnace from pure chromic oxide and iron or magnetite. The aim was to reduce the percentage of carbon to a minimum, and to increase the chromium to a maximum.

The best results were obtained when using a lime-fluorspar slag, to which chromite was added, the melting being continued for half an hour; longer periods increased the refining effect, but decreased the yields, especially that of chromium. The losses of chromium in all the experiments were very heavy. It is concluded that it was impossible, under the conditions obtaining, to entirely eliminate the carbon.

### British Imports of Ores.

For the two calendar years of 1906 and 1907, the imports of ores into Great Britain included the following:

Antimony, 11,907 tons in 1907, against 8,443 tons in 1906; cobalt, 1,921 tons, against 2,126 tons; copper, 103,742 tons, against 96,249 tons; lead, 13,394 tons, against 8,730 tons; manganese, 565,635 tons, against 338,423 tons; tin, 20,871 tons, against 20,672 tons; zinc, 65,032 tons, against 63,268 tons.

### Bauxite Deposits in India.

BY W. C. PHALEN.\*

It has recently been claimed that a source of aluminum might be found in India, where thousands of square miles are covered with deposits of aluminous laterite. True laterite is essentially a mixture of iron hydrate, aluminum hydrate, and free silica in varying proportions. It is identical in type with bauxite, being merely an iron rich variety of the latter, and by diminution in the iron oxide and increase in the alumina, laterite merges into bauxite. Between bauxite on the one hand and limonite on the other, all sorts of mixtures may occur.

In India laterite is reported as derived in part from rocks in place, as is the case with our Arkansas bauxite deposits, or as having been transported. The high level laterites of India are said to bear a striking resemblance to bauxite.

In examining the Vizagapatam hill tracts, C. S. Middlemiss has paid especial attention to the high level laterites of the Kalahandi state; and in the adjoining estate of Jeyore, he found the laterites occurring in beds 80 to 100 ft. thick, but limited to a very well marked plane surface from 3,500 to 4,000 ft. above sea level. This surface, owing to its uniformity and extent, is thought to have originated as a plain of marine denudation on which the laterite was subsequently formed and which was afterwards modified by the ordinary erosive action of subaerial agencies.

The area over which the ores are mainly developed stretches from the neighborhood of Korlapat in Kalahandi to the hills north of Dolamb on the Jeyore-Vizagapatam road. Deposits of aluminous laterite have also been studied in the Madras presidency, in the Central provinces, and in Kalkati in Bengal. The result has been the definite determination of a number of instances in which the percentage of alumina is as high as in the high-grade deposits mined as sources of alumina in Europe and America; and the material appears to exist in quantities altogether out of proportion to present consumption.

The purity of the India deposits, their ready accessibility, and their association with flowing water are all points in favor of their being worked, should the demand for aluminum in the world at large justify such a course.

At the present time, with present prices, a limited market, and the rate at which discoveries of new occurrences in the United States are being made, no bauxite has been found in India which in quantity and quality would compensate for the cost of export to American markets.

The feldspar deposits in the eastern and central western United States, some of which contain as much as 10% of potassium oxide, would afford an unlimited supply of potash if an economical method of extracting it were devised. Of the suitable feldspars, orthoclase and microcline (silicates of aluminum and potassium) are probably the most important.

\*Extract from Mineral Resources of U. S. for 1907.

# Method of Settling Slimes in Cyanide Treatment

By HORACE G. NICHOLS,\*

Mining and Metallurgical Engineer.

The number of new devices for filtering slimes which are now before the mining public is evidence of the difficulties attendant on the simple method of settling and decantation still largely employed. The two greatest objections to the simple settling process are the time occupied and the large percentage of liquid left in the slimes even after the most perfect settlement obtainable in the ordinary pointed tanks.

In the following notes a method of settling is described which has given remarkable results both in the completeness of the separation effected and in the small proportion of liquid carried off by the solid matter.

The principle involved is that of re-

*Principle of the method is "free settlement" of the slimes. Apparatus for accelerating the cyanide solution to prevent thickening.*

*Method of calculating results of process. Economical pulp separator. Filter and screen suction apparatus. Initial cost of plant low.*

charged with the solid matter will be appreciated at once as an advantage in cyanide practice; as also will be the greater degree of perfection of separation attainable in practice by this method than is possible in vacuum filter processes.

In connection with this principle, Messrs. Julian and Smart state in their "Cyaniding Gold and Silver Ores," p. 219: "Retardation is a function of the depth measured from the top of the still turbid portion of the liquid, to the bottom of the vessel," and again, lower down on the same page: "An increase of suspended matter causes a decrease in the rate of subsidence."

The following experiment will illustrate the retarding effect of the thickening of the medium on the falling of fine particles in liquid.

Two equal portions of the same pulp were taken and introduced respectively into two cylindrical graduates, one of which was empty, and the other partially filled with water. The relative rates of settlement were as set down in the accompanying table (Fig. 1).

A further step can be made by comparing the rate of settlement of a charge of pulp in a vessel closed in the first place at the bottom and in the second place connecting with a second closed vessel filled with water, and placed below it. An experiment made with a charge of 800 c.c. of pulp of a specific gravity of 1.544 showed that in the second case the rate of settling was just twice that in the first case.

These results are held to be in accord with the noted acceleration in the settlement of slime in distilled and hot water, which results are, without doubt, due to the reduced density of medium, and tend to show the marked effect on settlement produced by very small variations in specific gravity.

Now, if in place of providing the lower vessel as a receptacle for the settling slimes, such slime was removed, as fast as it settled, by a conveyor belt traveling under the upper vessel, the same result is produced, in that the specific gravity of the medium is not allowed to increase towards the bottom, and the settling is thus accelerated in the same measure.

The experiments were made in British Columbia on an ore of quartz with argillaceous material containing about 2% of sulphides of iron, zinc and lead, and particular care was taken to separate out the

heavier and coarser portions from the pulp to be used, by, in the first place, crushing with a very high discharge in a stamp battery, and then passing the pulp through an 8-in. square aperture with a flow from this classifier was used in making up the charges, and contained 86% of material which passed 200 mesh (Institution of Mining and Metallurgy standard dry screening).

The apparatus shown in Fig. 2 consisted of a pyramid shaped tank about 4 ft. by 5 ft. connecting at the bottom through an 8-in. square aperture with a closed box in which a 10-in. belt was made to travel slowly, power being supplied to the head roller D.

The tank was provided with a trap door just above its connection with the box B, and this door could be removed from above as desired, thus allowing free passage between the two vessels.

In conducting the tests here described, a charge of pulp representing a charge from an agitator vat was run into the tank A, and the trough B was filled with water up to the same level. While all pulp was still in suspension (air agitation being used) the trap was removed and the belt

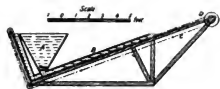


Fig. 2. Arrangement of Tank.

was run in the direction indicated by the arrows at a speed averaging 4 ft. per minute.

The removal of the solid matter from the belt was effected by a scraper. It was found that the finest slimes were carried out of the tank and discharged by the belt.

In making out tables of results it was found convenient to estimate the percentage of solid matter in the discharge by determining the specific gravity, having that of the ore known, and calculating from the formula

$$P = 100 \frac{s(a-1)}{a(s-1)}$$

$$a(s-1)$$

where  $a$  is the specific gravity of the pulp,  $P$  is the percentage of dry slime in the pulp, and  $s$  is the specific gravity of the dry slime. Checks were made on a number of individual charges of evaporation to establish the correctness of the calculations.

From a series of successive charges in which each succeeding charge was added to a residue from a previous one, it was found that the fine slime did not tend to accumulate in the tank and under the belt, and the latter was found to move with such little power that all friction was evidently very light.

The average discharge of a finely crushed ore in some cases did not contain over 25% moisture, including the

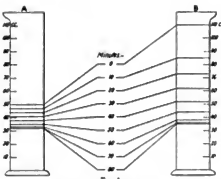


Fig. 1.

Pulp Taken 80 cc.			
No. 65-100.			
Placed in			
Graduate A (empty)		Graduate B (containing 80 cc. water)	
Services.		Services.	
Min.	cc. Mark.	Min.	cc. Mark.
0	50	0	110
10	47	10	86
20	44	20	73
30	41	30	62
40	38	40	52
50	35	50	44
60	32	60	36
70	28	70	28
80	25	80	26

Fig. 1. Cylindrical Graduates for Recording the Settlement of Slimes.

moving the solid matter as it reaches the bottom of the tank in which it is settled; and the effect is twofold, for the solid matter settles very compactly if not allowed to accumulate, and its removal prevents the thickening of the liquid above, which is one of the principal causes of the slow and imperfect settlement of slimes.

The logic of this principle of "free settlement," which implies the elimination of the retarding effect due to an increase of the density of the medium during settlement in a closed vessel, by the accumulation of the slime itself in process of settling, is not, perhaps, perfectly clear, but the experiments to be described will, it is believed, establish the fact; while the exceptionally low percentage of liquid dis-

\*Abstract of paper read before British Inst. of Mg. & Met., Feb. 20, 1908.

finest slimes which were recovered completely from the water, while from a pulp containing 40% solids the initial discharge carried but 22.5% moisture. Such a discharge is more comparable with that of filters than with the product of settling tanks.

In practice this method may be applied in one or two ways.

1. It might be used as an intermittent process in which a charge of pulp from an agitator vat would be run direct to a separator (see accompanying illustration) which would be of sufficient capacity to hold the whole of such agitator charge in

a pulp having as high a specific gravity as 1.4.

Let, then, the belt and suction be so correlated with regard to a given supply of pulp that while the one removes the solids the other takes out the proportionate amount of solution, and it is evident that a continuous supply of pulp can be kept running to the separator which would then always contain a charge of uniform specific gravity.

In the illustration with the caption "suction and filter," two screens are represented as being opposite one to another, and the more entire disintegration of ac-

er perfectly washed or not, to make room for the next succeeding instalment.

In this method continual progression through the plant is unimpeded, and the slime may be washed with any reasonable amount of weak solution desired, without in any way affecting the time of treatment, the only factor affected being the capacity of the extractor boxes.

Dealing with the advantages of this method, it should be noted in the first place that the conveyor belts take the place of other means of transference, such as pumps, carrying machinery, etc., used in other plants for filtering slime, and that all other appliances and mechanical contrivances are done away with altogether, as gravity alone is enabled to perform the separation by reason of the possibility of taking advantage of the principle of free settlement.

Secondly. The separation of sands from slime is not called for, and consequently the many disadvantages attendant upon the attempts to deal with such classes of material as depend upon close classification are obviated.

Thirdly. It is possible to wash to the best advantage and thus reduce the loss by residual moisture by cutting down its value per ton as well as the amount.

Fourthly. Instances have been known in which fine grinding has been carried to an excess in order to make a process of vacuum filtering possible. In this process of separation, where the degree of fineness or uniformity is wholly immaterial, the demands of extraction alone are the criterion of grinding.

Fifthly. The initial cost is very low and there is entire absence of little niceties of adjustment.

Sixthly. The best results have been obtained from charges of high percentages of solids, and it may be claimed that the only limit of thickness of a charge is the point at which it will not run. This fea-

addition to a residual charge from a previous operation.

The object of this provision would be to allow of extracting on the belt only such proportion of the solid contents of a separator charge as could be effected with the economic minimum of moisture. The belt discharge from this separator would be delivered into a second similar tank, with addition of weaker solution or wash water, or both; and the liquid so added could be sprayed on to the discharging belt so as to loosen and disintegrate the discharged slime, or a mixer might be added for this purpose.

After withdrawal of the required proportion of the solid contents and clarification of the solution left in the tank, the latter would be withdrawn either by decantation or suction, to the original level, thus permitting of the introduction of a second charge. A third wash settler may also be used.

2. This method may be applied as a continuous process by the simple introduction of a suction and filter, which may assume the form represented in the accompanying illustration.

The percentage of moisture carried over in the discharge varies inversely with the percentage of solids in the separator charge, and the first portions of a discharge from any given separator charge are always better than the succeeding portions, hence we arrive at the fact that if the density of a separator charge is maintained at its initial density the percentage of moisture in the discharge would be kept at a minimum and the rate of discharge materially increased. Further, it has been found that if provision is made for keeping a filter or screen surface free from accumulated caked slime, which has been done by providing an automatic periodic cutting off of the suction applied to such filter or screen, and applying a small back pressure, that it is possible to continually withdraw clear solution from

accumulating slime is provided for by the back pressure being applied to the two screens alternately; the pulp from the agitator is shown as being charged in between the two screens.

Were it not that the solid constituents of the pulp are being extracted by the conveyor belt from the bottom of the vat, the continued use of these screen suction would, of course, not be possible, but by this method it is only necessary to adjust the relative capacities of the belt and suction in order to provide an absolutely continuous process of separation.

Practically the same course of pro-

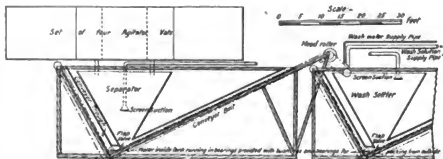


Fig. 3. Pulp Separator.

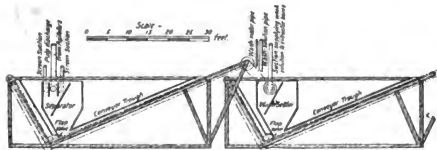


Fig. 4. Suction and Filtering Apparatus.

cedure obtains in the wash settlers. The discharge is washed off the belt by precipitated solution and water, and the suction arranged to withdraw an equal amount of solution. This solution is passed through the extractor boxes and returned from the sump.

In applying this system to cyanide treatment, it may be noted that in other processes the completeness of washing is dependent upon time and capacity of plant, inasmuch as each instalment of slime is taken separately and washed solution passed through it, as long as it is economically possible to do so, after which such instalment has to be removed, wheth-

ture is of great importance, seeing that it is only required to run the charge from the agitator to the first separator, and therefore far greater opportunities are afforded for preliminary decantation and thickening of the agitator charge.

Seventhly. The process may be continuous.

The careful assistance of T. S. Lawlor in carrying out the above tests is gratefully acknowledged.

The Urals in Russia produced 10,281 short tons of asbestos in 1907, principally near Ekaterinburg at the mines of Poklevsky & Co.

# Notes on Manufacture of Lithia from Lepidolite.

By WM. J. SCHIEFFELIN and  
T. W. GAPPON.\*

The comparatively rare oxide, lithia, may be obtained from various minerals, but the sources principally utilized are spodumene, anhydronite, petalite and lepidolite.

The lepidolite used in our process comes from Pala, San Diego county, Cal., and has the following composition: Lithia, 4.75%; alumina, 23.5 to 24.5%; potash, 12.5%; silica, 51%; fluorine, 2 to 4%, with traces of iron, manganese, etc.

Fusion and subsequent treatment of lepidolite with hydrochloric acid affords a ready means of decomposing the ore, but it was found desirable to have the bases present as sulphates, and eliminate the necessity for fusing the mineral; here, however, a difficulty presents itself. Unfused lepidolite, according to Dana, Mendeleef, and others, is only partly decomposed by acids—a conclusion which, it must be confessed, the first experiments of the chemist will tend to confirm, as without the adoption of special methods, a decomposition of from 60 to 75% is the most that can be obtained.

Joss, of Vienna, appears to have been the first to solve the problem of decomposing lepidolite with sulphuric acid, but his memoir on the subject, beyond publishing the fact, gave no details of the method of decomposition followed. As a result the process remained practically a secret; chemists who repeated the experiments failed to get complete decomposition of the ore. This too was our own experience, verified by repeated experiments. Finally it was found by adopting the following method, practically complete decomposition could be obtained (97 to 99%).

The success of this operation is mainly dependent on two factors, reduction of the ore to a uniformly fine state of division, and careful regulation of the heat applied.

The lepidolite finely powdered in a pebble mill, and bolted through a 160-mesh sieve, is mixed with 10% more than its weight of sulphuric acid (66 degs. B.) in a sheet steel mixer driven by power. The usual charge is 2,400 lbs. of ore. The mixture is stirred for half an hour, and then run through a lead lined sluice, on to a bed of rectangular furnace, lined with fire brick, 16 ft. long, by 6 ft. broad, and 2 ft. high, with a rather flat arched top. The furnace is provided with a coke furnace at one end, and an oil burner at the other. The heat and flame pass over the material, then under the furnace bed by four flues, and return, still underneath, by four flues, passing thence to the chimney, which is fitted with a steam aspirator to increase the draft.

The charge is kept at a temperature ranging from 112 to 120 degs. C., stirring frequently for three hours. The heat is then raised to 136 degs. C. The following conditions represent an actual decomposition of 95.9%. For three hours, temperature in furnace was 120 degs. C.; one hour at 136 degs. C.; 1½ hours at 136

*Minerals containing lithia. Source of supply of lepidolite. Improvements in the methods of treating lepidolite.*

*Operation of the alunite process for removing alumina and potash. Method of precipitating lithium carbonate. Construction and cost of furnace. Losses in and cost of producing lithia.*

degs. C.; 1½ hours at 194 degs. C.; one hour at 280 degs. C.; ¼ hour at 340 degs. C.; a total of 8½ hours. The maximum yield obtained on the industrial scale was 97%, the average being 94%.

The furnace cake is removed and leached while still warm, to bring the bases into solution; once this is effected, and the silica separated, which is easily done, the problem of lithia manufacture is reduced to that of the removal in manageable form of the considerable amount of alumina present. Manganese, calcium, and alkalis present no difficulties. No absolute alcohol or platinum vessels are required.

*Separation of Alumina.*—Here a departure from the procedure given in the published accounts was found necessary. These usually prescribe removal as hydroxide by milk of lime, whether or not a part has been removed as alum. A few preliminary experiments are sufficient to show the necessity for eliminating this product in some concentrated form, as the voluminous hydrate holds lithia tenaciously, and is difficult to wash by any method. Hence it is likely that any process that contemplates separation in the form of hydroxide, is doomed to fail.

The advantage before referred to, of having the bases present as sulphates, now becomes apparent, as it opens up a way for the removal of part of the potassium and 50% of the alumina in the form of alum. The alum separation is effected by agitating the leached liquor, and adding sufficient potassium sulphate to convert all the aluminum sulphate not already so combined, into alum. A heavy precipitation of alum, in the form of a fine easily washed powder, the result of frequent stirring with an air current, takes place as the liquor cools. The first portions contain notable amounts of caesium and rubidium alum. In six days precipitation is complete.

The results, though good, are not as good in practice as they appear on paper; the calculated result is not obtained on account of an unexpected and rather curious change in the solubility of the alum, by which the mother liquor, instead of holding 10.5% (the strength of a saturated solution at normal temperature), is found to contain 23% of potash alum in solution. This difference (due to the solvent action of other salts present), while it

adds to the labor, and somewhat impairs the completeness of the succeeding step (the alunite process), does not prevent it from reducing the residual alum from 23 to 0.57% in one precipitation. Otherwise the residual alum could be reduced to 0.2% or less.

*Alunite Separation.*—This process removes alumina and potash as insoluble (basic) sulphates, leaving lithium sulphate in solution. It is based on the fact that by adding freshly precipitated aluminum hydroxide to alum solution, and boiling briskly, practically all the alumina precipitates as basic alum, or alunite (composition approximately  $K_2SO_4 \cdot 3Al_2O_3 \cdot 3SO_3 \cdot 6H_2O$ ).

Industrially, the process is carried out as follows: The mother liquor is decanted from the alum meal, and the latter centrifuged, affording a byproduct of commercial value, in quantity sufficient to pay for the sulphuric acid used. The clear solution is tested to find the amount of free acid and alumina present, and the proportion of sifted whitening chemically equivalent to the free acid and one-third of the alumina, is gradually stirred into the liquor until the free acid is neutralized; the stirring by air current is continued for an hour, and the solution allowed to stand over night.

Next day the rest of the whitening is added, the stirring continued for two hours and the liquor let stand to allow the calcium sulphate to precipitate, the liquor being kept cool to prevent one-third of the alumina (which now remains dissolved as free hydroxide) from prematurely precipitating. The removal of a third of the combined acid by whitening has the same effect as adding an equivalent of aluminum hydroxide. More cooling is required, as 33% is the maximum amount of hydroxide the alum liquor would dissolve. In displacing aluminum by calcium, as above, it was found advantageous to substitute whitening for milk of lime, the usual precipitant, as the latter caused clotting with the alumina, much of the lime goes down unchanged carrying lithia with it, which cannot be washed out. When whitening is used, the precipitate as it forms is disintegrated by the escaping carbon dioxide, the calcium sulphate produced is more easily washed; nevertheless, under the best conditions, loss of lithia is inevitable with this precipitate.

In the next stage, the clear solution is decanted from the calcium sulphate, and treated with freshly precipitated aluminum hydroxide, equal to half the alumina present in solution. The solution is rapidly brought to a boil (within an hour), and boiled for three-quarters of an hour, which precipitates the alumina, and much of the potash, as alunite.

The aluminum hydroxide for succeeding operations may be prepared by treating alunite with sufficient potassium carbonate to remove all the sulphuric acid as potassium sulphate, and leave the alumina in a dense form as a mixture of hydroxide and basic carbonate, in which form it reacts easily to form the alunite.

\*Abstract of paper read before New York section Soc. of Chem. Ind., April 24, 1908.

The clear solution is decanted from the precipitated alumina, and sufficient whiting added to precipitate the small amount (0.57%) of alumina left; it is boiled and finally made distinctly alkaline with hydrated lime, using for the purpose a "high calcium," not a dolomitic lime.

The clear solution, which consists mainly of lithium sulphate, a small amount of calcium sulphate, and traces of manganese and iron oxide, is decanted and concentrated by boiling until a specific gravity of 1.112 (hot) is reached (the tank in which this is done should be tin lined). Another pound or two of calcium hydrate is added, and the liquor allowed to cool and settle; it is then decanted, and freed from residual impurities as follows:

The calcium is removed as oxalate, by adding ammonia and oxalic acid solution, stirring and keeping the solution alkaline. A solution of potassium hypochlorite is also added to ensure removal of all traces of iron and manganese; the solution is allowed to stand over night, and the clear solution of pure lithium sulphate decanted into a tin lined tank.

**Precipitation of Lithium Carbonate.**—One-third of the lithium sulphate solution is added, in a tin lined tank, to a solution of potassium carbonate (specific gravity 1.5) slightly in excess of the amount required to precipitate all the lithium, and the mixture heated quickly to boiling (using a tin coil), with agitation; the rest of the lithium solution is added, and the whole boiled briskly for five minutes. A white precipitate of lithium carbonate forms and settles rapidly. The supernatant liquor is decanted and the moist precipitate quickly washed with hot water, stirred for five minutes, and allowed to settle. The carbonate is finally washed in a centrifugal machine until the washings are free from chlorides, and show only the faintest trace of sulphates. It is then transferred to trays and dried at 140 degs. F.

The following quantities represent operations during four weeks: Ore, 7,200 lbs.; sulphuric acid, 7,920 lbs.; potassium carbonate, 1,802 lbs.; whiting, 1,224 lbs.; oxalic acid, 105 lbs.; ammonia, 105 lbs.; labor, five men for four weeks. Products: Alum meal, 6,000 lbs.; lithium carbonate, 513 lbs.

#### DISCUSSION.

Dr. W. E. Wadman asked the writers what was the meaning of 97% decomposition of the ore? Did it mean percentage of lithia, or of alumina, or of potash made soluble, or did all the bases come out in the same ratio? (The writers said that all came out in the same ratio.) The cost of the furnace, stated at \$10, seemed to Dr. Wadman remarkably small.

Stress was laid on the value of having the bases present as sulphates. With solutions containing all the alumina, it was necessary to be able to remove a large part of it in the form of alum. However, there was a distinct disadvantage in working through the sulphates, owing to the greater solubility of lithium carbonate in the presence of the SO<sub>4</sub> ion than in the presence of the Cl ion, for instance. The final purified solution was stated to be practically pure lithium sulphate. This

could hardly be the case, as this solution must have contained a considerable amount of potassium sulphate. Alumina removed only one-third of the potash existing as alum, and consequently two-thirds must remain with the lithium sulphate. This was of some importance for reasons above referred to—that lithium carbonate was notably soluble in potassium sulphate solutions. In any case in working with the sulphate, one must inevitably end up with a saturated solution of potassium sulphate, but the more there was present, the relatively greater was the loss from solubility of lithium carbonate.

An important fact in the process was the very low yields obtained. In percentages of the possible amounts, the yields were 39% of alum, 60.8% of lithium carbonate, and 34% potash (K<sub>2</sub>O) recovered. The losses amounted to about 9,000 lbs. of alum, 350 lbs. of lithium carbonate, and 1,165 lbs. of actual potash. So far from recovering any potash from the ore, there was an actual deficit of 265 lbs. of potash from that added as carbonate.

The costs of the process appeared to be about 97.5 cents per lb. of lithia, from which must be deducted a revenue from the alum amounting to 20 cents per lb. of lithia, giving net cost of the lithia carbonate, 77½ cents, this being a practically irreducible minimum on the basis of the writers' figures, says Dr. Wadman.

He considered the ammoniacal time limit test prescribed by the United States Pharmacopoeia was unnecessarily severe and difficult to comply with. The test for heavy metals was reasonable and reasonably easy to attain, but it was almost impossible to get rid of the last trace of iron, which was quite unobjectionable, but nevertheless responded to the hydrogen sulphide test.

The writers, in reply, said that as the temperature in the furnace was below 300 degs. C. nearly all the time, it was unnecessary to use fire brick, except on the floor, and the cheapest brick was used for the rest of the furnace, the top being a flat arch of single brick and covered with sand. The furnace was held together by iron bars across the top, and took 10 days to construct by the labor of one mason at \$2 a day; the cost of the materials did not exceed \$20. The potash and lithia in the filtrate from the final carbonate precipitation were not lost, as the filtrate was put back into the process. The cost also might be reduced slightly by selling the separated silica, which amounted to half the weight of the ore used, and which was in a very finely divided state. The separated alumina could also be used for the production of alum.

Dr. Wadman's estimate of the cost was very close. In fact, the writers estimated it at 90 cents per lb. When the price of lithia was \$3.50 per lb. they undertook to make it at a cost of \$1 per lb. When the price fell to 40 cents per lb., due to the fact that the consumption did not increase in proportion as the production increased, manufacture was discontinued.

Graphite imports into Great Britain last year were 15,528 long tons, against 15,735 tons in 1906; a decrease of 207 tons.

## Silver Mining in Saxony.

BY THOMAS H. NORTON.\*

One of the oldest and best known silver mines in Europe, that of Freiberg in Saxony, is soon to be permanently closed, after a long continued and practically uninterrupted period of exploitation, dating back to 1163.

During these past centuries the rich veins have formed one of the most valuable sources of income of the royal house of Saxony. Since the serious depreciation in the value of silver it has become more and more manifest that it is economically impossible to compete with the richer ores of America.

For several years past instead of yielding revenue the mines have been operated at a serious loss to the state. For the current year the deficit is \$229,000. Working operations have gradually been restricted and the output steadily lessened. The value of the silver mined in 1905 was only \$285,900. The mines would have been closed before this had the Saxon government not shrunk from exposing the large mining population of Freiberg to the misery sure to follow a complete cessation of work.

On April 28, the Saxon minister of finance announced that the mines would be definitely closed in 1913. Many of the older miners in the employ of the state will be pensioned, and every effort made to lessen the economic effects following necessarily upon the final execution of this decision.

Interesting in this connection, and indicative of the genuinely paternal instinct at the basis of many governmental features in Germany, is this careful provision to prevent suffering to the families and the community as a result of the relentless working of natural economic laws.

The many Americans who have gained their metallurgical training in the Bergakademie (School of Mines) at Freiberg will welcome the decision of the Saxon government to still maintain this valuable institution.

## American Machinery Exports.

During May and the 11 months of the fiscal year, the exports from the United States included the following machinery:

	May.	11 months.
Electrical .....	\$169,058	\$7,325,722
Metal working .....	425,847	8,280,432
Mining .....	265,698	4,118,126
Pumps and pumping .....	238,328	3,111,519
Locomotives .....	250,012	8,288,691
Stationary engines .....	207,370	2,802,669
Boilers and parts of engines .....	268,096	2,742,519
All other machinery .....	3,208,601	45,968,586
Total .....	\$5,518,163	\$83,969,284

The increase for the 11 months this year is \$2,867,311, or 34%.

The largest foreign buyers of American machinery are Canada, Mexico, South America, Great Britain, Germany, Italy, France, Belgium, Japan and Australia. Substantial purchases have also been made by South Africa, and a few other far eastern countries.

\*American consul at Chemnitz.

## The Wisconsin-Illinois-Iowa District.

BY J. V. WELSPORD.

At a distance of 160 miles from Chicago and close to the center of the great corn belt, lying on either side of the Mississippi river, in the corners of Wisconsin, Iowa and Illinois, is a vast tract of land of which little is known outside of its immediate neighborhood. This tract is in the counties of Grant, La Fayette and Iowa in Wisconsin, Jo Davies in Illinois and Dubuque in Iowa, an area of about 3,500 square miles. Underlying the rich agricultural surface of this great tract is a wealth of minerals running hundreds of feet in depth.

There are four cities in the district, namely, Dubuque, Iowa, Galena, Ill., and Platteville and Mineral Point, Wis. Of these most notable is Dubuque, which is a prosperous city of nearly 50,000 inhabitants. The other three have populations varying from 5,000 to 7,000, and are growing. The other principal mining centers are Cuba City, Benton, Hazel Green, Shullsburg, Dodgeville, Livingston, Portos, Linden, Mifflin and Highland. These are all thriving towns, equipped with water power, electric light, and telephone service, and have fine residences, good schools and churches. Each has fair railroad facilities, and the field is now ripe for electric interurbans and centrally located power plants to furnish electric power to mines, mills, and factories. The climate is temperate and healthy.

The ores mined are lead (lead sulphide or galena) zinc (zinc sulphide and carbonate), copper, sulphur and iron. These ores form in fissures, flats and pitches, and there are large bodies disseminated in the rock. Large bodies of lead are also found in boulder formation, in pieces weighing from 50 to 1,500 lbs.

There are deposits of copper which can be operated with profit. The Indians before the advent of the white men smelted large quantities of the ore and the ruins of their furnaces are yet to be seen at many places in the district. Large deposits of sulphur occur at various places, notably at Linden, where it is being mined profitably.

The ores are found at shallow depths, the average being 80 ft. in some localities and 100 ft. in others, and there are still others in which they occur from the grass roots.

The method of mining is simple and comparatively inexpensive, no more than \$50,000 to \$100,000 being required to prospect, develop and equip the mines with concentrating mills and other machinery for operation within nine to 15 months. Some 400 mines in the district have been developed or are in a process of development. Of this number 105 have been equipped with concentrating mills in the last three years, a majority of them during the last 18 months. There are now 50 additional mills contracted for erection this year.

Eight years ago there was one small mill in the entire district, on the Raisin-Leck mine at Cuba City. The zinc output for the year 1907 was \$3,500,000. Upwards of \$50,000,000 of lead and zinc, principally lead, was extracted in the dis-

trict prior to 1905. This recovery was accomplished by the most primitive methods in mining, the upper runs of lead and zinc carbonate, which were found from 20 to 40 ft. below the surface and above water level. The discovery of large bodies of zinc ore in the lower levels by means of churn drills encouraged the installation of modern mining machinery, and work has been vigorously pushed over a limited extent of the field.

There are now more than two dozen mines in the district which have paid their owners dividends of from 5 to 50% monthly. To illustrate, one mine has paid \$260,000 on its capital of \$30,000, and another \$210,000 on \$20,000, each within the past three years. These mines have each paid \$10,000 for equipment and each now has a good reserve fund.

In addition to the lead and zinc there are many thousands tons of other products which annually are treated as waste, because no provision has been made to save them. Some of these byproducts if properly cared for would be of greater value than lead and zinc solely for which the mines are now being operated.

Some of the valuable byproducts are the following:

**Iron Sulphide.**—Thousands of tons of this mineral are found in conjunction with zinc ore. By the employment of the proper process the iron in this sulphide can be made a valuable product. Sulphuric acid, for which there is an increasing demand, is also manufactured from this product. For handling this product there is now but one plant in the district: it is at Mineral Point, Wis.

**Oil Rock.**—This rock is found in every zinc range in the district, in layers of from 2 to 12 ft. thick. Under proper manipulation this rock will produce from 30 to 50 gals. of oil and 4,000 to 5,000 cu. ft. of gas to the ton.

The oil is an excellent preservative of wood, makes a good lubricant, and can be refined for illuminating purposes. The gas may be used for heating and illuminating purposes, and gives an intense heat and bright light. The process of separating the oil and gas from the rock carbonizes the rock, which, when ground, forms a pigment that resembles graphite. A paint made from this pigment is not affected by sulphuric acid, salt water or any other corrosive element.

**Clay.**—In the different strata are found an abundance of clays suitable for the manufacture of fine china, terra cotta and pressed brick. Another clay found in large quantities, when properly prepared, possesses all the qualities of fuller's earth, which is largely used by oil refiners.

**Ocher.**—Both red and yellow ocher, many tons of which are found in the district, need only proper handling to make them valuable.

Under the system of mining leases in vogue the land owners receive a royalty of 10% of all ores mined, as a rental. At the present time there are more than 50 land owners in different localities throughout the district whose incomes amount to from \$500 to \$2,000 per month, according to the output of the mines. Many land owners have become immensely wealthy from this source in past years.

## The Tin Fields of Queensland.—II

BY A. R. MACDONALD.\*

Considerable interest has been manifested during the year in the dredging possibilities of the numerous creeks and flats of the district. The long reaches and flats of the upper portion of Running creek especially have been declared by southern visitors to possess all the features favorable for dredging, and tests by boring are now being made to ascertain whether tin exists in sufficient quantities. Only one dredge has been actually operative—that of the Pilot Co. which, on its areas at the head of Oaky creek, has been encountering and gradually solving and surmounting the problems and perplexities that beset the establishment of an industry under strange and untried conditions.

Although heavy rain, both in the opening and the closing months of the year, caused some injury to races and shafts in the tin mining centers south of Cooktown, operations, on the whole, have been fairly successful. The Queensland Tin Shifting Co., after a year's delay caused by impassable roads, has completed the construction of a hydraulic plant that will probably serve as a model to other mine owners in the district. Water, conveyed by pipes from the Home Rule falls to the Home Rule claim, a distance of 1¼ miles, sweeps the material to be treated into a sump, where it is lifted by hydraulic pressure, and discharged into a tailrace made of red cedar obtained in the neighborhood.

The Annan River Tin Mines, whose race from one of the heads of Parrot creek to its Leswell leases is seven miles long, were from lack of water towards the close of the year obliged to suspend sluicing operations, but continued to develop their Collingwood lode.

At the Phenician Co.'s mine three tunnels were driven, and 31¼ tons of ore from the No. 2 tunnel, treated at the Trivelpark works, yielded 4 tons of 70% tin. The Mount Roman Tin Mining Co. has been testing its dredging claims on the Annan by an effective system of boring, at places to a depth of 50 ft. On the Upper Bloomfield a party of men, assisted by the government, are constructing a race to bring water from the Roaring Meg falls to their claims at Lode hill, a distance of 3½ miles.

More than 30 men are now mining alluvial tin at Mount Windsor and the other heads of the Palmer river, and about the same number find profitable employment at the Archer river, in the northern part of the peninsula.

There are signs of awakening curiosity with respect to the resources of the somewhat inaccessible regions to the south of Cooktown, and the Warden refers to the special interest displayed by visitors to the district in the possible application to economic purposes of the great water power of the mountainous watershed of the Annan and the Bloomfield.

Dredge mining at Stanthorpe is gradually being established as an important branch of the industry, and last year two additional dredges were brought into

\*Extract from Queensland government report for 1907.

commission. The Rover Proprietary has disposed of its original plant, and, dispensing with the services of a punt, now carry on operations from land, confident that the periodical removal of the pump and engines will be less costly than the method formerly followed. Much delay occurred in the substitution of the new plant, and the output for 1907 was 18 tons.

The Paddock Swamp Co., with a new centrifugal sluicing plant, commenced work in September last on an area about nine miles from Stanthorpe. The ground, which has been well tested by boring, averages about 2 lbs. per yd. The Stanthorpe Proprietary—the pioneer dredge of the field—working principally over old ground, from 377,300 tons of earth recovered 60 tons of tin.

The Spring Creek Co., having purchased the discarded Rover plant, is ready to begin operations when rain falls.

A southern syndicate has acquired about 50 acres of dredging land at Quartpot creek, and, should examination of the ground show the expenditure to be warranted, will install a centrifugal pump sluicing plant. The Broadwater Co. after a somewhat disappointing experience, has sold its plant. The Dalcoath Syndicate is about to make careful tests of its areas.

The gradual exhaustion of the known sources of stream tin and insufficiency of water for sluicing purposes have constrained the miners at Stanhill, in the Croydon field, to pay more attention to the development of the lodes in that locality. Three promising mines—the Brilliant, the Vincent, and the Mount Cassiterite—are now being opened up, the first already known as one of the principal lodes of the field, the others comparatively recent discoveries. Three tons of ore from the Brilliant, shipped to Sydney during the year, gave a net return of £82 (\$398); 13 tons from the shaft of the Vincent, crushed and dressed at Croydon, yielded 9½% black tin, and 12 tons from the open-cut of the Cassiterite, also treated at Croydon, returned 8½% black tin. A number of other lodes are held and worked by individual miners.

The Lancelwood tin field (Angore and Truxillo), on Elizabeth creek, about 16 miles from Quartz hill, and near the boundary line between the Etheridge and the Walsh and Tinaroof fields, has afforded fairly remunerative occupation to some 50 men, whose winnings for 1907 may be set down as, approximately, 58 tons. Large quantities of stacked earth were also being washed at the beginning of the present year.

Among the later accessions to our tin mining centers may be mentioned the small communities at Stockyard and Sandy creeks, on the Hilkgoor Run, about 70 miles northwest from Charters Towers, where several lodes of more than average quality are being opened. At Sandy creek especially some excellent returns have been obtained, ranging from 7% to 30% of tin oxide, but the cost of cartage and treatment prohibits stone carrying less than 5% being sent to the battery at Stockyard creek, which is about 15 miles distant. The total output from this quarter last year was 36½ tons of tin.

## Coal Mining Industry of Utah.

BY EDWARD W. PARKER.\*

Although the monetary disturbances in the last three months of 1907 are clearly reflected by the statistics of the coal mining industry in Utah, the record made in the mines of the state during the first nine months of the year was sufficient to more than balance the effects of the depression when the coal production of 1907 is compared with that of preceding years.

During 1906, which up to last year held the record as the most prosperous, the production of coal amounted to 1,772,551 short tons, valued at \$2,408,381. In 1907 the output reached 1,947,607 tons, \$2,950,709. The increase in production in the latter year amounted to 9.88% and the increase in value to 22.89%.

These statistics indicate that until the effects of the panic began to be felt in the latter part of the year the demand for Utah coal had been somewhat in excess of the supply and was accompanied by the higher prices natural under such conditions. The business was also most satisfactory to the operators in other ways, for the product of the mines was handled by the railroads in a gratifying manner, and there were but few complaints of shortage of car supply.

The coal mines of Utah gave employment in 1907 to 2,303 men, who worked an average of 258 days, the average in 1906 having been 288 days for 1,572 men. The record for 1907 shows a distinct loss in the average efficiency of the mine workers, the production per man having decreased from 1,127.6 tons in 1906 to 884 tons in 1907. In 1905 the average production per man was 979 tons. The average daily production per man in Utah in 1907 was 3.43 tons, against 3.92 tons in 1906 and 2.96 tons in 1905.

Labor disturbances in the coal mines of Utah have been few during the last three years. In 1907 there was only one strike, and this, which affected 148 men, lasted only four days. In 1905 and 1906 there were practically no labor disturbances.

J. E. Pettit, who has succeeded Gomer Thomas as state mine inspector, reports that in 1907 there were six fatal and 82 nonfatal accidents in the coal mines. Of the fatal accidents three were due to falls of roof or coal, one was the result of an explosion, and two resulted from other causes. Of the nonfatal accidents, six were of a serious character; 26 were due to falls of roof or coal, four to gas or dust explosions, and 52 to other causes. The death rate per 1,000 employees was 2.74 in 1907, as against 4.45 in 1906, and the number of tons mined for each life lost was 324,601 in 1907, as against 253,222 in 1906.

The coal fields are important and widely distributed, and, grouped geographically, comprise the Book Cliffs, Wasatch, Weber River, Southern Utah, and small scattered fields. The Book Cliffs field, with its southern extension, the Wasatch field, is the largest. The coal bearing rocks of this field underlie many thousands of square miles of the Uinta basin and outcrop along its southern margin in the Book Cliffs of western Colorado and

eastern Utah. The coals of this field are of upper Cretaceous age and occur in several beds, ranging from 3 to 20 ft. in thickness. The lowlands at the base of the Book Cliffs is traversed by the Rio Grande Western railroad. The mines at Sunnyside, Castlegate, Winter Quarters, and Clear Creek produce 95% of the output. The coal is a medium grade bituminous and yields a good quality of coke, over 550,000 tons of the total production of the state in 1907 having been used for this purpose.

The Weber River field, in the northern part of the state, is at present next in importance to the Book Cliffs. It has an area of only a few square miles, but it is reached by a branch of the Union Pacific railroad, and two beds, ranging in thickness from 7 to 14 ft. are mined at Coalville.

The other coal fields of Utah, with the exception of a small area in Sanpete county, where a thin bed is mined at Sterling, on the Sanpete Valley railroad, are far from railroads and are practically undeveloped.

## American Foreign Copper Trade.

Exports of copper from the United States continue large, and for the first five months of this year and last were as follows, in pounds, the contents of copper in ore and matte being estimated:

Europe—	1907.	1908.	Changes.
Belgium	1,084,641	2,631,685	1,547,044
France	25,400,112	52,081,248	26,681,136
Germany	31,551,274	57,777,230	26,225,956
Gr. Brit.	16,096,979	61,901,351	45,804,372
Holland	645,540	91,638,546	90,993,006
Italy	7,636,212	12,583,661	4,947,449
Russia	2,400,519	93,339,319	90,938,800
Other	428,997	29,750,428	12,321,431
Total	139,652,335	292,398,209	152,745,874
Canada	4,675,989	5,209,131	533,142
Mexico	2,306,584	1,840,424	466,160
China	—	12,244,247	12,244,247
Other	106,986	1,653,528	1,546,542
Gr. total	144,740,394	312,396,146	167,655,752

The imports of copper for the same period were as below, in pounds:

In ore and matte.	1907.	1908.	Changes.
France	28,201,265	18,162,741	10,038,524
Gr. Brit.	93,251,486	60,074,727	33,176,759
Other	—	—	—
Total	121,552,751	68,237,468	53,315,283
Re-exported	399,741	390,821	8,920
Net imp.	121,552,751	67,846,647	53,306,363

The total imports were distributed by country as below:

Europe—	1907.	1908.	Changes.
France	406,662	55,348	351,314
Germany	3,429,625	433,883	2,995,742
Gr. Brit.	18,508,295	8,252,129	10,256,166
Other	3,768,761	1,552,234	2,216,527
Total	27,005,690	7,385,571	19,620,119
Canada	12,561,688	14,399,289	1,837,601
Mexico	55,876,984	15,245,207	40,631,777
So. Am.	12,525,795	14,544,195	1,738,310
W. & Iberia	628,178	703,623	75,445
Japan	3,016,247	85,112	2,931,135
Other	6,954,169	21,525,966	14,571,797
Grand total	121,552,751	68,237,468	53,315,283

The ore and matte imported this year contained 18,162,741 lbs. of copper, as against 28,201,265 lbs. in 1907; a decrease of 10,038,524 lbs. Mexico supplied this year, 3,538,351 lbs., as against 16,350,657 lbs. in 1907; Canada, 4,276,522 lbs. against 5,495,444 lbs.; South America, 4,448,589 lbs. against 3,881,683 lbs.; and other countries the remainder of the copper in ore and matte.

\*Extracted from Mineral Resources of U. S. for 1907.

### Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

#### GOVERNMENT APPROPRIATIONS.

The Editor:

Your editorial in the issue of The Mining World of June 27 is gratifying to the members of the United States Geological Survey, in that it expresses an appreciation both of the purposes of the organization and of its problems.

You are quite correct in the statement that the appropriations for the current year are inadequate for the execution of plans that were earlier prepared for the consideration of the Secretary of the Interior. Each year the administrative chiefs of the Survey outline investigations whose importance is brought home to them from their contact with the mining industry, and each year when the final field plans are perfected the inauguration of many of these investigations is deferred to some future date. The net result of this policy of postponement to which the Survey is of necessity committed, is that scientific and economic problems of the first rank remain untouched by the government scientists, though the importance of the problems is fully recognized and appreciated by them.

The mining industry has developed so rapidly in this country that the Survey, with the funds at its disposal, has never been able to keep abreast of the development, to say nothing of extending its work in advance, where it would be of even greater benefit. A few months ago I mentioned to the House Committee on Appropriations five lines along which certain expansion is demanded.

1. Extension of detailed areal mapping in regions where active development of mineral deposits is in progress; prospecting is cheapened and a much larger proportion of the ore in a deposit is won when the areal and structural geology of a region is known; hence a double economy is effected.

2. Systematic investigation of the saline deposits, salt, borax, soda, niter, etc.
3. Investigation of the origin of coal; this promises important scientific and economic results.

4. Investigation of the principles of structural geology comparable with Van Hise's work on metamorphism.

5. Geologic reconnaissance of little known regions in the west, chiefly in southern California, Arizona, New Mexico, Utah, Nevada, Oregon and Idaho.

The rapid progress in the development of the mining industry has also greatly increased the amount of work that should be done in connection with the preparation of the annual report on the Mineral Resources of the United States.

One of the most striking illustrations of the phenomenal growth of the mineral industry in this country is the fact that the value of the coal produced in 1897 was almost equal to the value of the entire mineral production of the year 1897, or only 10 years earlier. The result is that the present appropriation of \$75,000 does

not provide for all of the work which it seems advisable to do in this line.

I was pleased to note your mention of the Alaskan work of the Survey. Here again the lack of funds interferes seriously with the execution of a comprehensive plan of work, inasmuch as the urgency of specific mining problems may in any one year practically exhaust the available appropriation. This appropriation of \$80,000 for work in Alaska is only sufficient to provide for a part of the investigations and explorations that demand immediate attention.

The increased demand for topographic surveys all over the country makes the allotment of the present appropriation of \$300,000 a difficult task. The standard of the topographic maps is being constantly raised and each month the public makes increased use of the published maps, a considerable part of the distribution being to mining men and corporations.

The water resources investigations not only serve the purposes of navigation, irrigation, flood control, and swamp-land drainage, which are subjects of vital interest to the American public at the present day, but these investigations also furnish the most important contribution to the subject of waterpower development, which is of the greatest interest to the mining industry. Here it is apparent that the present appropriation of \$100,000 (which is only half the amount appropriated three years ago), is wholly insufficient to enable the Survey engineers to continue work along all of these lines.

In the technologic work of the Survey the new appropriation item of \$150,000 for investigating mine explosions marks, as you suggest, only a beginning in this important work. The amount appropriated is less than that recommended in the carefully prepared estimate submitted to Congress by Secretary Garfield and the investigations under this appropriation are limited to mine explosions, which cause generally less than 15% of the injuries and fatalities in mining. The broadening of the investigations to include other phases of the problem looking to the greater safety, health and efficiency in mining would be highly beneficial to the industry.

The administration of this new investigation into mine explosions has been entrusted to the Geological Survey by the Secretary of the Interior, and it is the purpose to inaugurate the work on scientific lines that will commend it to practical mining men. In the event of the establishment of a bureau of mines or mining technology, the investigations that relate to the technical side of mining will be transferred to the new organization; and it is to be hoped that more adequate provision will be made another year for this special inquiry into the causes of mining disasters.

You have touched upon the most serious problem in the conduct of the Survey work in your mention of the relatively low salaries paid to the government geologists and engineers. In my report of last year to the Secretary of the Interior I commented on this subject as follows:

The geologic branch of the Survey is experiencing embarrassment by its success as a training school for mining geologists. The increasing exodus of such geologists by reason of their employment by large

mining companies at salaries much greater than those paid them by the government seriously impairs the efficiency of the economic work of the Survey. During the last year the Survey has lost the services of seven geologists in this way.

It is obvious that in order to continue to command the services of trained men who are leaders in investigative work of value to the mining industry, the Geological Survey must gradually raise the standard of compensation. To be successful in its field the Survey must both attract and keep the best men.

Geo. OTIS SMITH,  
Director U. S. Geological Survey.  
Washington, D. C., July 1, 1908.

### New Publications.

Publishers are invited to send all books and pamphlets of subjects relating to mining, metallurgy, chemistry and kindred industries, to the Review Editor of The Mining World. Whenever possible state selling price of publications.

*Geology and Mineral Resources of the Controller Bay Region, Alaska.* By G. C. Martin. Washington, D. C., 1908; Government Printing Office. Pp. 141 +v; with map and illustrations.

*The Foreign Commerce and Navigation of the United States for the Year Ending June 30, 1907.* O. P. Austin, chief of bureau of statistics. Washington, D. C.; Government Printing Office. Pages, 1327.

*The Fairbanks and Rampart Quadrangles, Yukon-Tanana Region, Alaska.* By J. M. Prindle. With a Section on the Rampart Placers. By F. L. Hess. And a Paper on the Water Supply of the Fairbanks Region. By C. C. Covert. Washington, D. C., 1908; Government Printing Office. Pp. 102 +v; with maps.

### American Lead Imports.

The imports of lead into the United States for the first five months this year were 90,669,807 lbs. in ore and base bullion, and 2,046,753 lbs. in pigs, bars, etc.; a total of 92,716,560 lbs. Last year the imports were 50,332,984 lbs. in ore and base bullion and 14,070,773 lbs. in pigs, bars, etc.; total, 64,403,757 lbs.

Of the total imports this year Mexico supplied 89,056,063 lbs. in ore and base bullion, against 42,692,279 lbs. in 1907; and Canada, 1,287,347 lbs., against 7,450,747 lbs.; the remainder being from various other countries.

Re-exports of foreign lead for the five months this year were 68,733,833 lbs. in ore and base bullion. Thus there was left for domestic consumption 23,982,727 lbs. of this year's total imports.

Last year the re-exports were 24,430,168 lbs., leaving for domestic consumption 39,973,589 lbs.

In other words, there has been shown a decrease of 15,900,862 lbs., or about 40% in the American consumption of foreign lead during the first five months of the current year.

Cobalt occurs in a number of metallic combinations, the principal ore of the metal being smaltite. Cobalt has never been found native.



# Current Literature on Mining, Metallurgy, Etc.

*Diavory Before Location.* R. W. Raymond. Discusses the law as it prevails in the United States and as it may affect Ontario.—*Can. Mg. J.*, June 15, 1908; p. 1. 30 cents.

*Physical Tests of Iowa Limes.* Ira A. Williams. Continuation of a previous article—Iowa Engr., May, 1908; pp. 184; illus. 60 cents.

*Michigan Copper Mining Methods.* Lee Fraser. Describes the geology and the difficulties experienced in mining.—*M. & S. P.*, June 20, 1908; pp. 34; illus. 20 cents.

*The Furnace Plant of the Northwestern Iron Co., Mayville, Wis.* Description of the equipment of this plant.—*Ir. Tr. Rev.*, June 25, 1908; pp. 54; illus. 20 cents.

*Bauxite: Its Occurrence and Production in U. S.* W. C. Phalen. Describes the geology of the bauxite deposits in Georgia, Alabama, Tennessee and Arkansas, and gives analysis of ore from a new location.—*The Mining World*, June 27, 1908; p. 14.

*Group Electric Shot Firing.* Sydney F. Walker. The uncertainty of group shot firing in electrical fuses is due to differences in the fuses themselves, and in the action of the current when passing through them. Describes the fuses and how to test them, and outlines the factors of safety in firing.—*E. & M. J.*, June 20, 1908; p. 2. 20 cents.

*Note on the Valuation of Commercial Potassium Chlorate.* John R. Ekeley. The method described is simple and gives good results.—*West. Chem. & Met.*, June, 1908; 200 words. 75 cents.

*Monazite and Zircon Industries.* Douglas B. Stierrett. Gives the production and uses of monazite and zircon.—*The Mining World*, June 27, 1908; 560 words.

*Mining Tale in North Carolina.* Description of the mine at Hewitts, method of working, and preparation of tale for market.—*Ir. Tr. Rev.*, June 25, 1908; pp. 34; illus. 20 cents.

*Working a Coal Seam of Moderate Thickness.* George Raymon Dixon. Describes a method of extracting pillars without causing crush and creep. Refers also to the haulage system.—*E. & M. J.*, June 20, 1908; pp. 21/6; illus. 20 cents.

*Recovering Antimony from Ores, etc.* John Roy Masson. Describes an improved process, recently patented, for recovering antimony in a pure state from ores, concentrates, tailings and slimes.—*The Mining World*, June 27, 1908; 350 words.

*Cyanidation in Nevada.* A. G. Kirby. Gives the results of mill runs on about 700 tons of the sulphide ores taken from the lower levels of the Combination and Mohawk mines at Goldfield. The extraction by amalgamation was 26.82%; by

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

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concentration, 33.04%; by leaching sand, 86.90%; and extraction from slime, 80.93%—total extraction by cyanidation, 32.91%, and by amalgamation, concentration and cyanidation, 92.77%. Gives costs of treating the ores.—*M. & S. P.*, June 20, 1908; pp. 1. 20 cents.

*Plant of the Illinois Valley Sand Co.* The sand in the deposits of this company, some four miles west of Ottawa, Ill., analyzes 98 to 99% silica. Description of the drying and crushing plant.—*Ir. Tr. Rev.*, June 25, 1908; pp. 14; illus. 20 cents.

*Gypsum Deposits of Montana.* J. P. Rowe. Describes the geology of the deposits, and method of preparing the gypsum for market.—*E. & M. J.*, June 20, 1908; p. 1; illus. 20 cents.

*How Rescue Work can be Carried on Effectively.* W. E. Mingramm. Describes the use of oxygen in the Draeger apparatus for resuscitating asphyxiated persons from inhaling after-damp or carbon monoxide. Comments on the equipment of a rescue station, and method of training men for saving lives in mines.—*The Mining World*, June 27, 1908; p. 14; illus.

*Goldfield, Nevada.* T. A. Rickard. In this, the fifth article, of an instructive series, the writer discusses the metallurgy of the ores.—*M. & S. P.*, June 20, 1908; pp. 4; illus. 20 cents.

*Reverberatory Smelting of Copper Ore.* C. Offerhaus. This is the second article of the series; it refers to the charging of the furnace, skimming and tapping. Also gives the monthly report of the Anaconda reverberatory plant.—*E. & M. J.*, June 20, 1908; pp. 5; illus. 20 cents.

*Diffusion as a Factor in Ore Deposition.* Lemis T. Wright. Discussion of an interesting geologic problem. The writer believes that even though flow of minerals by aqueous diffusion in rocks may not be the predominant agency by which ore deposits have been formed, it nevertheless must have been frequently in operation.—*M. & S. P.*, June 20, 1908; pp. 2; illus. 20 cents.

*Geological Possibilities at Goldfield.* Arnold Becker. Notes the peculiarities of the geology of the district.—*M. & S. P.*, June 20, 1908; p. 1; illus. 20 cents.

*Natural Gas for Power Use in the Joplin District.* Otto Ruhl. Review of the development of natural gas for fuel and

power purposes in the zinc-lead districts of Missouri and Kansas. Gives costs of natural gas.—*The Mining World*, June 27, 1908; pp. 14.

*A Novel Bucket Elevator.* P. R. Whitman. Describes the construction of the bucket elevator installed in the mill at Concho, Chihuahua, Mexico, which has uncommon features.—*M. & S. P.*, June 20, 1908; 300 words. 20 cents.

*The Ore Deposits of Santa Eulalia, Mexico.* Claude T. Rice. Santa Eulalia is one of the largest lead-silver producing camps in Mexico, and probably is the largest producer of oxidized lead ore in the world. Reviews the history of the mines, and describes the geology of the district.—*E. & M. J.*, June 20, 1908; pp. 14; illus. 20 cents.

*Burning Liquid Fuel Without Steam or Compressed Air.* Robert Schorr. Describes American and European practice.—*M. & S. P.*, June 20, 1908; p. 14. 20 cents.

*An Improved Miner's Lamp.* Samuel J. Thompson. The two important features of the writer's invention are the crown of the cap, which is the reservoir for the oil, and the fibrous filling which is interposed between the reservoir and the wick so that the explosion of the lamp is prevented.—*The Mining World*, June 27, 1908; 500 words; illus.

*Haulage System at the Yak Tunnel.* E. C. De Wolf. Description of the methods employed in handling the ore and waste at this tunnel in the Leadville district, Colo.—*Mg. & Met. J.*, June 26, 1908; pp. 24; illus. 20 cents.

*Oscillating Table for Fine Sands.* Ermio Ferraris. Describes an oscillating table which is employed at the Montepocalamine works in Sardinia.—*Bi-Mon. Bull. A. I. M. E.*; abstract in *The Mining World*, July 4, 1908; 1,000 words; illus.

*The Electrolytic Refining of Zinc.* Otto Steiner. Describes the various stages of the operation, and outlines the construction of a commercial plant.—*Elektrochem. Zeit.*, May, 1908; pp. 3. (In German.) 60 cents.

*Rock Oxidation at Cripple Creek.* Philip Argall. The following summary is made by the writer: (1) Sulphide zone—the practically unaltered rock. (2) Zone of partial oxidation—the rock mostly oxidized on the faces, joints, cleavages and fissures. (3) Zone of thorough oxidation—the pyrite all oxidized and the rock softened and stained with oxides, none of the original color being left. (4) Zone of disintegration—rock thoroughly oxidized and disintegrated, reduced in fact to ferruginous clays and talc.—*M. & S. P.*, June 27, 1908; pp. 1; illus. 20 cents.

*Development of the Tin Fields of Queensland.* A. R. Macdonald. Describes lode and alluvial tin mining, and mentions some of the more important properties.—*The Mining World*, July 4, 1908; p. 2.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 25 cents with the title, number, and date of patent to the Mining World. Remittances may be made by coin, stamps, or postoffice money order.

## WEEK, JUNE 23, 1908.

**Smelting Furnace.** John S. Leder, Reno, Nev., assignor to the Leder Smelter and Refiner Co., Reno, Nev. (891,349; filed Sept. 18, 1906.)

**Apparatus for Coke Ovens.** Thomas J. Mitchell and James A. McCreary, Johnston, Pa. (891,355; filed Jan. 30, 1908.)

**Treating Slimes from Electrolytic Refining of Lead.** Anson G. Betts, Troy, N. Y. (891,395; filed Dec. 8, 1908.)

**Treating Anode Slime from the Electrolytic Refining of Lead.** Anson G. Betts, Troy, N. Y. (891,396; filed Feb. 20, 1907.)

**Fry Concentrator.** Homer P. Curtis, Denver, Colo., assignor to the Curtis Dry Placer Machinery Co., Denver Colo. (891,609; filed May 27, 1907.)

**Separator.** Robert W. Jessup, Oakland, Cal., assignor of one-half to Fairfax H. Whelan, Oakland, Cal. (891,423; filed Aug. 8, 1906.)

**Rinse-Holding Apparatus for Furnaces.** William A. Wheeler, Worthington, England. (891,422; filed Dec. 21, 1907.)

**Process of Treating Crushed Ore Products.** William A. Caldeault, Johannesburg, Transvaal. (891,428; filed Jan. 1, 1907.)

**Pulverizer.** Edward A. Evans and David Tilley, Columbus, Ohio, assignors, by mesne assignments to the Jeffrey Manufacturing Co., corporation of Ohio. (891,431; filed Aug. 14, 1906.)

**Tunnel Driving Machine.** George A. Fowler, Georgetown, Colo., assignor, one-fourth to Edward J. Wilson, Georgetown, Colo., and one-fourth to Frank V. Gust, Clear Creek county, Colo. (891,477; filed July 29, 1906.)

**Process for the Treatment of Slag from Tin Smelting Furnaces.** George T. Hollister, London, England. (891,486; filed Feb. 10, 1908.)

**Apparatus for Treating Tin Scrap.** Meredith L. Leitch, Birmingham, England, assignor to Metal Process Co., New York. (891,486; filed Mar. 26, 1908.)

**Stamp Mill.** Francis I. Matthews, Oakland, Cal., assignor to Oakland Stamp Mill Co., (Oakland, Cal. (891,497; filed July 19, 1907.)

**Packing.** Robert L. Ambrose, North Tarrytown, N. Y., assignor to Ingersoll-Rand Co., New York, a corporation of New Jersey. (891,519; filed Dec. 4, 1906.)

**Ladle for Molten Metal.** Gustav A. Haase, McKeesport, Pa., assignor to Pittsburgh Steel Foundry, Pittsburgh, Pa. (891,542; filed June 27, 1907.)

**Ore Reducing Furnace.** John T. Jones, Iron Mountain, Mich., assignor of one-half to George A. St. Clair, Duluth, Minn. (891,549; filed Dec. 22, 1907.)

**Process of Reducing Metallic Oxides.** Edward Price and Frederick M. Beckett, Niagara Falls, N. Y., assignors, by mesne assignments, to Central Process Co., of New York, trustee. (891,546; filed Aug. 4, 1907.)

**Process of Smelting Ores.** Frederick L. McAlahan, St. Louis, Mo. (891,630; filed June 28, 1905.)

**Holding and Conveying Apparatus.** John McMyler, Cleveland, Ohio, assignor to The McMyler & Manufacturing Co., Cleveland, O. (891,621; filed Oct. 1906.)

**Rope and Cable Grip.** Robert Schutz, Leipzig, Elbtitzsch, Germany, assignor to A. Reichert & Co., Leipzig, Germany. (891,639; filed Mar. 12, 1908.)

**Manufacture of Aluminate.** Otto Dieffenbach, Griesheim, Germany, assignor to Chemische Fabrik Griesheim-Electron, Frankfurt-on-the-Main, Germany. (891,626; filed June 28, 1905.)

**Filling Apparatus for Conveyors.** Charles W. Hunt, New York. (891,638; filed April 3, 1908.)

**Chain Shell Bucket.** Charles W. Hunt, New York. (891,639; filed April 4, 1908.)

**Method of Treating Ore.** John T. Jones, Iron Mountain, Mich., assignor of one-half to St. Clair A. Duluth, Minn. (891,705; filed Jan. 11, 1908.)

**Removal of Arsenic from Liquids and Gases.** Oscar Jonas, Griesheim-Electron, Germany, assignor to Chemische Fabrik

Griesheim-Electron, Frankfurt-on-the-Main, Germany. (891,703; filed Mar. 4, 1907.)

**Chain Shell Bucket.** Charles W. King, New York, N. Y., assignor to C. W. Hunt Co., New York. (891,706; filed April 4, 1908.)

**Charging Device for Furnaces, Receiving Vessels, or the Like.** Ludwig Mond, London, England. (891,712; filed Aug. 26, 1906.)

**Wood Preserving Compound.** Herbert E. Perival, Houston, Tex., assignor to Perival Wood-Preserving Co., Houston, Tex. (891,726; filed Oct. 19, 1907.)

**Concrete Mixer.** George P. White, Wallace, Idaho. (891,756; filed Sept. 17, 1906.)

**Coal Tipple.** Ross M. Mackley, Pittsburg, Pa. (891,760; filed Sept. 2, 1907.)

**Telescope for Surveying Instruments.** Frank Heitzler, Denver, Colo. (891,773; filed April 1, 1907.)

**Removal of Arsenic from Liquids and Gases.** Oscar Jonas, Griesheim, Germany, assignor to Chemische Fabrik Griesheim-Electron, Frankfurt-on-the-Main, Germany. (891,775; filed Jan. 25, 1907.)

## WEEK, JUNE 30, 1908.

**Screening Machine.** Robert J. Cunningham, Holyoke, Mass., assignor to International Steam Pump Co., New York, N. Y.; assignor of one-half to New Jersey. (891,821; filed Mar. 2, 1907.)

**Oven Apparatus.** Thomas J. Mitchell and James A. McCreary, Johnston, Pa. (891,432; filed Jan. 30, 1908.)

**Charging Device for Gas Producers.** Hawley Pettibone, Cuddey, Wisc., assignor to Edward and Minnie Machinists, New York, N. Y., a corporation of New Jersey. (891,858; filed Sept. 8, 1906.)

**Process of Making Low Carbon Metals or Alloys.** Frederick M. Beckett, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a corporation of West Virginia. (891,898; filed Aug. 21, 1906.)

**Dumping Bucket.** Louis A. Lehmann, Corona, N. Y. (891,940; filed Nov. 11, 1907.)

**Process of Producing Cast Iron.** Charles Hancock, Mich. (891,942; filed Jan. 24, 1907.)

**Brick Kiln.** Ernest R. McKisick, Adel, Iowa, assignor of one-fourth to William I. McKisick, one-fourth to Ward Mitchell, and one-fourth to Andrew J. McKisick, Des Moines, Iowa. (891,946; filed July 2, 1907.)

**Electrolytic Process for the Production of Metallic Dredge Coating Upon Metals.** Charles Achenbach, Germany. (891,982; filed Sept. 3, 1907.)

**Crucible Furnace.** Edward H. Schwartz, Chicago, Ill., assignor to Kroschell Brothers, Chicago, Ill. (892,012; filed Jan. 16, 1908.)

**Machine for Quenching Coal.** Paul H. Douglas, Cleveland, Ohio, assignor to the Wellman-Beaver-Morgan Co., Cleveland, Ohio. (892,022; filed Sept. 21, 1907.)

**Coke Extractor.** George R. Foust, Macomb, Pa. (892,066; filed Nov. 1, 1907.)

**Ore Concentrator.** Frank G. Janney, Salt Lake City, Utah. (892,064; filed April 24, 1907.)

**Rock Drilling Machine.** William Prellwitz, Easton, Pa., assignor to Ingersoll-Rand Co., New York, N. Y., a corporation of New Jersey. (892,082; filed Jan. 16, 1908.)

**Excavating Tool.** Philo Scott, Pine, N. Y. (892,083; filed Nov. 4, 1907.)

**Deep Well Cable Pump.** Harry C. Sillett, Salt Lake City, Utah. (892,082; filed Jan. 25, 1908.)

**Air Compressor.** James Thornton, Jr., and James Thornton, Jr., Dupont, Ill. (892,098; filed May 9, 1906.)

**Extracting Precious Metals from Their Ores.** John R. Almaguer, New York, N. Y. (892,110; filed Aug. 16, 1905.)

**Oil Well Pumping Mechanism.** Daniel R. Vanburden, Vanburden, Ind. (892,129; filed June 16, 1906.)

**Process for Separating and Simultaneously Extirpating Water From Mineral, Vegetable, and Animal Substances.** Botho Scherwin, Frankfurt-on-the-Main, Germany, assignor to Farbwerke vorm. Meisterwerke, Frankfurt-on-the-Main, Germany. (892,188; filed April 30, 1907.)

**Process of Producing Low Carbon Alloys.** Frederick M. Beckett, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a corporation of West Virginia. (892,211; filed Jan. 16, 1908.)

**Process for Improving the Physical Properties of Metals and their Alloys.** David Lamon, Denver, Colo. (892,249; filed Sept. 11, 1906.)

## Legal Decisions.

**Location Notice; Construction.** The object of a location notice is to give notice to subsequent locators; and if a location notice is defective a subsequent locator will be bound to take actual notice of the prior location, at least so far as such defects are concerned. It is the policy of the law that location notices should receive a liberal construction, to the end of upholding locations made in good faith. —Henshaw v. Gold Mining Co. vs. North Sunbeam Gold Co., Idaho; 95 Pacific 14.

**Location Notice; Amendment.** — Where the location of a mining claim is made in good faith it will be sufficient if the language employed in the description will impart notice to subsequent locators. And amendments may be made under the statute where they do not interfere with existing rights, and when so made they relate back to the date of the original location, in permitting amendments it is the policy of the law, not to avoid a location for defects in the notice, but rather give the locator an opportunity to correct his certificate or notice, and where defects are found therein. —Henshaw v. Gold Mining Co. vs. North Sunbeam Gold Co., Idaho; 95 Pacific 14.

**Recording Location Notice; Effect.** — The location notice when recorded is prima facie evidence of all the facts it is required by the statute to contain, and which are sufficiently set forth therein; and with the affidavit of the locator attached setting out the facts, the fact that the locator has taken a prima facie case. The notice is prima facie evidence of all facts required by the statute to contain, which are in fact, sufficiently stated in the notice. A notice in the statute may be corrected by actual evidence. The fact that the locator's work was done is the principal question, and its sufficiency is to be tested. —Henshaw v. Gold Mining Co. vs. North Sunbeam Gold Co., Idaho; 95 Pacific 14.

**Natural Gas; Waste and Use.** — It is now the law that waste of gas is considered a right of action against the owner of other wells in the same district for damages for illegal use of the gas. The waste of the gas; but no right of action exists for exhaustion resulting from the legitimate use or sale of the gas. —Henshaw v. Gold Mining Co. vs. Franzell, Kentucky; 109 Southwestern 228.

**Mining Claim; Quiet Title; Complaint.** — In a quiet title action, where a mining claim in support of an adverse proceeding pending in a land office, a complaint was held sufficient to state the cause of action, a prior locator, did not have a valid location; that his claim was never marked nor monumented on the ground so that a boundary could be distinctly traced; that the surface boundaries of the claim were never marked by any substantial posts projecting 4 ft. above the surface, nor were such boundaries marked by substantial stone mounds or bluffs; and against the objection that the complaint should have alleged the discovery of gold was sufficient where it averred that the plaintiff in a peaceable and lawful manner explored said claim and discovered and found placer gold. —Phillips vs. Smith, Arizona; 95 Pacific 91.

**Sale of Mine; Contract to Approve.** — A contract to approve a mining claim, made by a purchaser of the claim, was made with a trustee and was not to be operative until ratified by the purchaser. The contract to purchase so should remain in force for 30 days for the purpose of being ratified by the purchaser or such other company as might be thereafter formed for the purpose of working the mine, and the sellers should be entitled to share in the profits of the mine. In the ratification of the contract by the purchaser, it was held that the clause as to the formation of a corporation to purchase it instead of the purchaser became inoperative, and the sellers are not entitled to any stock in a corporation which afterwards acquired the claim. —Millory vs. Globe Boston Copper Mining Co., Arizona; 94 Pacific 1116.

**Contract for Sale of Mine; Performance of Conditions.** — A contract for the sale of mining claims, made by a purchaser of the claims, was made with a trustee and was not to be operative until ratified by the purchaser. The contract to purchase so should remain in force for 30 days for the purpose of being ratified by the purchaser or such other company as might be thereafter formed for the purpose of working the mine, and the sellers should be entitled to share in the profits of the mine. In the ratification of the contract by the purchaser, it was held that the clause as to the formation of a corporation to purchase it instead of the purchaser became inoperative, and the sellers are not entitled to any stock in a corporation which afterwards acquired the claim. —Millory vs. Globe Boston Copper Mining Co., Arizona; 94 Pacific 1116.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### Direct Connected Water Wheel Hoist.

A novel mine hoist to be operated by two direct-connected Pelton water wheels has just been built and installed by the Lidgerwood Mfg. Co. of New York, for the new Albany shaft of the United Mines Corporation on the north fork of the Tuolumne river, California. The illustration of the hoist herewith was made from a photograph taken in the erecting shop of the Lidgerwood works at Brooklyn, N. Y.

The hoist itself, the method of operating it and its location are all unique. The group of mines, the mill and the water power development which is to supply operative power and lighting have many interesting features.

The hoist is located at the bottom of a deep gulch where the water wheels get the full benefit of a 400-ft. head of water

through six levers, all placed conveniently together in a rack at the right side of the hoist bed plate next to the water wheels. Each lever has a thumb latch to hold it in place.

The hoist is geared. The pinion shaft extends across the bed plate immediately in front of the lever rack, bringing the pinions and clutches directly under the observation of the operator. The right hand end of the pinion shaft extends beyond the bed plate and carries a flange coupling to which the shaft of the water wheels is bolted. The pinions are loose upon their shaft and each drum can be brought into operation by means of a massive jaw clutch controlled by one of the operating levers. Of the six levers in the rack, two operate the clutches—one for each drum—and two bring into action the band brakes on the drums. The other two levers give control over

the movements of the pistons. This valve gear is of the floating lever type, so that the pistons follow closely the movement of the master control levers in the operator's rack. Connection is made between the levers and valves by means of rock shafts and levers. Water is supplied to the wheels by a 24-in. pipe line. This terminates in a header from which the connections are taken for the two nozzles. Each wheel inlet is provided with a gate valve. The wheels have an upper housing of steel. Like the hoist, they are carried on a substantial masonry foundation. The wheel bearings are carried on heavy cast iron sole plates.

### Trade Publications.

*Positive Blowers.* Piqua Blower Co., Piqua, Ohio. Circulars. Illustrated.

Show several types of the company's positive blowers for smelting furnaces, oil burning furnaces, etc. A blower attached to direct current motor is shown in one of the circulars which it is claimed is particularly adapted for foundry use.

*Well Drilling.* The Cyclone Drill Co., Orrville, Ohio. Pamphlet. Pp. 24; illustrated.

This is a little booklet published by the company as an aid to drill men in securing water well work. It contains much interesting information and presents many reasons in favor of the deep bored well from the standpoint of sanitation.

*Loading and Unloading Machinery.* The Brown Hoisting Machinery Co., Cleveland, Ohio. Pp. 24; illustrated.

Is mainly devoted to half-tone reproductions from photographs of a few of the company's installations of machinery for the rapid and economical handling of coal, coke, etc., in gas and electric light plants. The company makes a specialty of designing equipment to meet your requirements.

*Gas and Gasoline Engines.* Jacobson Machine Mfg. Co., Warren, Pa. Bulletin F; illustrated.

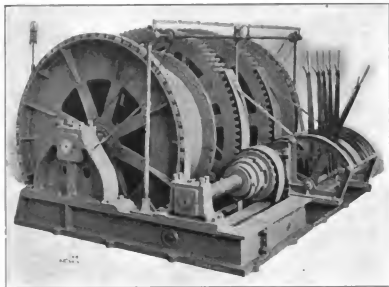
A general description is given of the company's line of hit-and-miss type engines, which operate on the 4-cycle system, taking an explosion every two revolutions. Brief specifications and illustrations of the different types follow, including one for general power purposes built in 3 to 6 h. p. sizes.

*Balances and Weights.* The Thompson Balance Co., Denver, Colo. Pp. 32; illustrated.

Is devoted to an illustration and description of the company's large line of balances and weights of precision for metallurgists and chemists, which includes some data concerning same and methods of manufacture. A number of testimonials of satisfied users of the company's product are also given.

*Industrial Cars.* The Youngstown Car Mfg. Co., Youngstown, Ohio. Pp. 24; illustrated.

This booklet shows but a few of the very many industrial cars manufactured by the company, but nevertheless some idea is given of the great diversity of its



Lidgerwood Mine Hoist.

while the shaft is on the mountain side almost directly above with the head sheaves of the shaft 750 ft. away from the hoist. The new Albany shaft is now 700 ft. deep, but it is to be sunk to a depth of 3,000 ft.

The hoist has two drums, each 72 ins. in diameter and 35 ins. width of face each and are grooved for 1 1/4-in. rope. Each drum is independent and each has its own pinion, clutch, gear wheel, brake, operating levers and indicator. Each drum has its own shaft carried on independent bearings. The gear wheels are keyed to the shafts and the drums are bolted to the gear. All of the bearings for drums and pinions are carried on a heavy cast iron bed plate of I-section so that they cannot get out of line. The indicators are of the horizontal sliding type, each actuated by a chain belt connection with a sprocket wheel on the drum, operating a threaded shaft along which the indicators move. Control over the hoist and water wheels is exercised

through the water wheels. One is for the forward action and the other for the reverse.

The power end of the apparatus consists of two Pelton wheels mounted side by side on a single horizontal shaft. This shaft is coupled directly to the pinion shaft of the hoist. The shaft is 7 ins. in diameter. The water wheels are each 8 ft. in diameter and each has a capacity of 600 h. p. under a 350-ft. head. They are operated under a head of 400 ft.

Each wheel is operated by a single 12-in. needle valve nozzle. The nozzles are arranged on opposite sides of the wheels, one at the front and the other at the back of the hoist, so that by using one or the other the motion of the hoist is reversed. The needle valves are operated by hydraulic cylinders, taking their power from the standing head of water. The stems of the valves have the pistons of the hydraulic cylinders attached directly to them.

Four way valves on the cylinders con-

equipment. Whatever the purpose and whatever the design, the company is prepared to meet your requirements, either from plans of its own or from yours.

**Cyanide Plants, Tanks, Etc.** Pacific Tank Co., San Francisco, Cal. Catalog No. 7. Pp. 128; illustrated.

This is an attractively printed catalog covering the company's large line of wooden tanks, cyanide plants and cyanide plant supplies. A number of half-tones are shown of plants in various parts of the country equipped by the company. It contains in addition much valuable information to mining and mill men. A copy will be sent free on request.

**Gas and Gasoline Engines.** New Era Gas Engine Co., Dayton, Ohio. Catalog No. 28N; illustrated.

The New Era line of engines is fully described. These can be operated by natural or producer gas, gasoline, kerosene or alcohol. The different types of engines are shown and un-assembled parts of machines are illustrated and their construction and special features are fully described. The engines are built in vertical pattern in sizes from 1½ to 5 h. p. and in horizontal types from 8 to 150 h. p.

**Mine Fans.** The Jeffrey Manufacturing Co., Columbus, Ohio. Catalog 26. Pp. 24; illustrated.

Like all Jeffrey publications this catalog is well printed and clearly sets forth the advantages of the equipment to which it is devoted. This is confined to an illustration and description of the Jeffrey centrifugal fan for mine ventilation. The special features of this fan are the positions and curvatures of the vanes, which discharge the air in a true radial direction, with no dragging effect on the wheel, and the conical scoops which, by their special forms and positions, prevent the gushing of air from the inlet.

### Industrial Notes.

The Deister Concentrator Co., Fort Wayne, Ind., has secured an order for 70 of its No. 3 concentrating tables from the Goldfield Cons. Mines Co., for installation at the latter's mill in Goldfield, Nev.

The Main Belting Co., Philadelphia, Pa., has opened a Pittsburgh branch at 208 Third avenue. Leviathan belting for power transmission, conveying, elevating, is kept in complete stock for prompt filling of orders.

The Pemberton Injector Co., Detroit, Mich., announces that, beginning with the July issue, the Engineer and Fireman will be increased from a 32 to an 80-page magazine. A free sample copy will be mailed upon request.

The Taylor Foundry & Engineering Co., Grass Valley, Cal., has shipped a 10-ton vacuum filter to the Oregon Reduction Co. This is a duplicate of the one which the same company turned out for another mining company a short time ago.

The H. W. Johns-Manville Co., New York city, announces the opening of a branch office at 30 South Pennsylvania street, Indianapolis, Ind. It will be in

charge of Charles E. Wehr, who for several years has represented the company in that section.

The Schutte & Koerting Co., Philadelphia, manufacturer of steam and engineering specialties for power plants, chemical and other industries, has opened a branch sales office in the Keenan building, Pittsburgh, where it is represented by E. A. Knowlton.

James S. Watson, manager of the drive chain department of the Link Belt Co., has transferred his headquarters from the Philadelphia works to the company's chain manufacturing plant at Indianapolis, where he will combine supervision of manufacture with direction of the selling force.

The Buffalo Foundry & Machine Co., Buffalo, N. Y., manufacturer of castings and builder of vacuum drying and impregnating machines, compressors, pumps, etc., has established a New York office at 113 Liberty street, in charge of H. E. Jacoby as resident engineer and manager.

The Heine Boiler Co., St. Louis, has begun work on the construction of its new manufacturing plant. The building yards embrace about 10 acres on Markens avenue near Grand, in the Belt Line territory. It is proposed to make the Heine plant one of the largest boiler making establishments in the country.

The Eton Talc Mining Co., Atlantic City, N. J., has been incorporated to mine talc, barytes, and other ores and minerals, with a capital of \$100,000. The incorporators are Jesse B. Thompson, Daniel W. Meyers, Jacob O. Meyers, 9202 Pacific avenue, and Samuel H. Kelly, 3205 Pacific avenue, all of Atlantic City, N. J.

The Arthur Koppel Co., Koppel, near Beaver, Pa., recently made shipment of 200 mine cars to the Copper Queen Cons. Mining Co., Bisbee, Ariz. The cars are side dumping and specially designed for use with dump cars of the 3-body standard gage type, each of 12 cu. yd. capacity, for a western railroad.

The Hampson-Fielding Engineering Co., Denver, Colo., has been recently incorporated and will take over the business of the old machinery house of Hampson & Fielding. The new company will remain at the old location on Tremont street, opposite the Brown Palace hotel. Chas. M. Hampson is president and Thos. Fielding, secretary and treasurer.

The Wood Drill Works, Paterson, N. J., has received an order for 12 of its 3½ drills from the United States government for work on the Panama canal. An additional order of 25 is being turned out at the company's works. The company's drills are also being used in the main line tunnel of the Chicago, Milwaukee & St. Paul railroad through the Bitter Root range of the Rocky mountains, near Taft, Mont.

The Acheson Oilslag Co. of Niagara Falls, N. Y., manufacturer of "oilslag" and "aquadag," has elected the following officers: President, Edward G. Acheson, Jr.; secretary, W. H. Arison; treasurer,

A. M. Williamson. The president is a son of the well known inventor and electric furnace expert, Edward Goodrich Acheson, who discovered the oilslag and aquadag processes. The company's offices and works are at Niagara Falls.

The Pittsburg Gage & Supply Co., Pittsburg, Pa., reports decided increase in the sales of its White Star oil filters and continuous oiling systems. A number of oiling systems have been installed in the various plants of the Carnegie Steel Co. in the past and two more installations have just been completed at the Carrie Furnace, Rankin, Pa. The following is a partial list of other sales and recent installations: Republic Iron & Steel Co., Raimond, Ala.; American Iron & Steel Mfg. Co., Lebanon, Pa.; Monongahela River Coal & Coke Co., Pittsburg, Pa.; New River Collieries Co., Thurmond, W. Va.

The Cutler-Hammer Mfg. Co., Milwaukee, Wis., makers of electric controlling devices, announces that it has just completed arrangements whereby it will be represented on the Pacific coast by Otis & Squires, 111 New Montgomery street, San Francisco. A large stock of standard Cutler-Hammer controllers will be carried by Otis & Squires enabling them to make prompt delivery of apparatus. A. W. Vinson, who has for several years been connected with the engineering department of the Cutler-Hammer Mfg. Co., has been transferred to the office of Otis & Squires where his services will be available to those confronted with problems of electric control which cannot be met by the use of standard apparatus.

Messrs. Adam Cook's Sons, 313 West street, New York City, N. Y., makers of Albany grease, recently received the following letter from H. N. Saxton, Jr., president of the Knoxville (Tenn.) Saw Mill Co., telling of an interesting experience with Albany grease, and pointing a remedy to lubrication troubles generally: "Friends of ours some time ago had trouble with the bearings on the bottom shaft of a hand resaw. They said they had tried everything that had been suggested, but still the bearing continued to heat. An expert was called in and said the shaft must have sprung. They took out their shaft and had it tried up, but the bearing still got hot. They asked our advice and we recommended Albany grease, which they tried and have had no further trouble. We had the same experience some time ago with the bearings on our band mill on account of the strain. The box kept burning out and we decided to try Albany grease on this bearing and have had no further trouble. You cannot recommend it too strongly for the use on bearings in a hand saw mill."

The exports of sulphur from Sicily for the first four months this year amounted to 179,537 tons, of which only 3,472 tons were for the United States. Last year the exports were 155,151 tons, of which 442 tons were for the United States. Stocks at Sicilian ports on April 30, 1908, were 545,005 tons, as against 510,491 tons at the same date last year.

### Personal.

Samuel Newhouse of Salt Lake city is in New York city.

C. W. Dodge, Jr., is now in charge of the Denver office of Spurr & Cox.

A. W. Bradley has returned to Idaho Springs, Colo., from Duluth, Minn.

Arthur Lakes of Denver is in the southwest on professional business.

Ernest G. Fielding is now associated with the Fulton Iron Works, San Francisco, Cal.

Dr. R. W. Raymond, secretary of the American Institute of Mining Engineers, is in Europe.

George Mainhart has resigned as manager of the Champion Mining Co., Nevada City, Cal.

J. W. Bradley has resigned as superintendent of the San Martin mine in the San Juan district, Osage, Mex.

E. N. Atkins of DeGolia & Atkins, San Francisco, Cal., is examining mining property in Tuolumne county, California.

W. Murdoch Wiley has resigned as president and director of the San Gregorio Mining & Railway Co., Guanajuato, Mex.

Charles Trezona has been made general manager of all the Oliver Iron Mining Co.'s properties on the Vermilion range.

James T. Kessel, Jr., of Park City, Utah, has accepted a position with the American Smelting & Refining Co. in Mexico.

A. A. Hasson, mining geologist and consulting engineer, Brooklyn, N. Y., will leave this week for Canada on an extensive exploration trip.

J. Parke Channing was in Butte, Mont., last week looking over the properties of the General Development Co. and the South Butte Mining Co.

Floyd Harmon, formerly superintendent of the Temiskaming mine at Cobalt, Ont., is now in charge of the Cochrane property in the same camp.

W. C. Greene is in Cananea, Mex., at the present time, but will sail for Japan some time next week. He will spend the next two years in foreign countries.

Leo Greenough has been appointed manager of the Snowstorm Mining Co., with properties in the Cour d'Alenes, Idaho, succeeding John Mocine, resigned.

Henry Hamberg, manager of the Princeton Copper Mining & Smelting Co., has returned to the company's property at Fort Huachuca, Ariz., from Pittsburg, Pa.

George A. Laird of Smith & Laird, mining engineers, Bisbee, Ariz., has been appointed consulting engineer for the Commodore Mining Co., Congress Junction, Ariz.

W. G. Nichols, former assistant superintendent of the Taylor Iron & Steel Co., Highbridge, N. J., has accepted the position of superintendent of the manga-

nese steel department at the Chicago Heights works of the American Brake Shoe & Foundry Co.

Seeley W. Mudd, at one time connected with the Guggenheims, is devoting his attention to the Queen Esther mines near Mojave, Cal., and the Ray properties at Kelvin, Ariz.

W. C. Thomas will shortly resign as superintendent of the Dominion Copper Co.'s smelter at Boundary Falls, B. C., and will return to Salt Lake, Utah. He will be succeeded by P. F. Roosa.

A. Chester Beatty is still connected with the Guggenheim Exploration Co., despite reports to the contrary. John Hays Hammond, however, having severed all connection with the company.

Fred Lyon, who was recently made assistant manager of the United States Smelting, Refining & Mining Co., has completed an inspection of the company's property in Utah and is now on a like mission in California.

R. R. Horner, lately manager of the Consolidated Goldfields, Ltd., of South Africa, and mining engineer for the Penoles Mining Co., Mapimi, Durango, Mexico, has opened an office in the Peyton block, Spokane, Wash.

T. J. Leavitt, formerly chief electrician of the Real division of the Real del Monte Co., at Pachuca, Hidalgo, Mexico, has accepted a position with the Benito Juarez Co., in charge of the mechanical and electrical departments.

Courtland Palmer has been made general manager of the Guanajuato Development Co., Guanajuato, Mex., and associated concerns. He will also act as consulting engineer for the Esperanza Mining Co. in El Oro district, Mexico.

Austin H. Brown has resigned as general manager of the Trinity Copper Co. and has been succeeded by Roy N. Bishop of the Balaklava Cons. Copper Co. and the First National Copper Co. The present address of Mr. Brown is at Redding, Cal.

S. P. Dunn and E. K. Foster, president and secretary, respectively, of the Seneca Mining & Milling Co., of Los Angeles, are at the company's property in Phymas county, California, on business connected with the installation of additional milling capacity.

### Technical Schools and Societies.

**The Iron and Steel Institute.**—The autumn meeting of the institute will be held at Middlesbrough, England, Sept. 28, 29 and 30 and October 1. The provisional program is as follows: On Monday, September 28, the members will arrive at Middlesbrough, and in the evening there will be a conversazione and concert by invitation of the reception committee, in the Town Hall. The mornings of Tuesday, Wednesday and Thursday, September 29 and 30 and October 1, will be devoted to the reading and discussion of papers. On Tuesday luncheon will be provided by invitation of the reception committee; works will be visited

in the afternoon. On Wednesday luncheon will be provided, and in the afternoon members will be invited to the official opening of Smith's dry docks on the Tynes, and in the evening a banquet will be given by invitation of the reception committee. On Thursday, October 1, the members will be invited to luncheon by the Cleveland Institution of Engineers.

**Canadian Mining Institute.**—A meeting of the western branch of the institute was held at Rossland, B. C., last week for the purpose of arranging for the reception of the members of the institute and their friends and guests who will visit this section in September. The guests of the institute will be accredited representatives of the principal mining and metallurgical societies of Great Britain and the continent, press representatives, etc. For the purpose of entertaining these distinguished visitors the Dominion government has set aside \$10,000, the Province of Ontario \$3,000 and British Columbia will appropriate \$3,000 at least. A committee of the local mine managers was formed to arrange for the reception of the party in this camp when they will be shown the various points of interest at the mines and tendered a banquet.

**American Institute of Chemical Engineers.**—The committee appointed at Atlantic City last June to consider the advisability of the formation of an American Institute of Chemical Engineers, decided that a mail vote would be the best method of determining the sentiment of American chemists toward the proposed new organization. This mail vote was decisive in showing a strong sentiment for the formation of the institute, and as a consequence a meeting was called for the purpose of organization. This inaugural meeting was held in the Engineers' Club, Philadelphia, Pa., on June 22, and Dr. C. F. McKenna was made temporary chairman. The committee on constitution reported a draft of the constitution, which defined the purposes of the institute, the proposed qualifications of the members, dues, etc. The yearly dues were fixed at \$15, with no initiation fees at present, the age limit at 30 years, and 10 years' practical experience in chemical engineering. The committee on nominations presented the following names for officers of the institute: President, Samuel P. Sadler, Philadelphia; first vice-president, C. F. McKenna, New York; second vice-president, A. Hunke, St. Louis; third vice-president, E. G. Acheson, Niagara Falls; treasurer, W. M. Booth, Syracuse; secretary, J. C. Olsen, Brooklyn; auditor, R. K. Meade, Nazareth, Pa. The directors will be for one year: Ludwig Reiter, Berkeley, Cal.; Thorne Smith, Isabella, Tenn.; H. F. Brown, Wilmington, Del.; for two years: J. M. Camp, Duquesne, Pa.; C. A. Catlin, Providence, R. I.; Eugene Haanel, Ottawa, Canada; for three years: G. P. Adamson, Easton, Pa.; David Wesson, Wilmington, Del., and E. Gudeman, Chicago, Ill.

The search for alluvial gold should be guided by the fact that it is usually deposited where the current of a stream has been checked.

# Late News From The World's Mining Camps.

## ARIZONA.

By STAFF CORRESPONDENTS.

**Globe.**  
The Globe Standard Co. is actively prosecuting development. Two shifts are working in the shaft, which is down nearly 200 ft. A station will be cut at a depth of 200 ft. and a crosscut started. The company has sufficient funds to complete the work laid out.

The Arizona National Copper Co. is doing some work on its property and contracts have been let on adjoining claims for development work.

The Old Dominion is making heavy shipments of copper bars. One shipment amounted to \$60,000 lbs. At the time of this writing there still remained a large quantity of the metal on hand.

The Red Springs shaft of the Miami Copper Co. has reached a depth of about 700 ft. and a new level will be started at 670 ft. Developments have been pushed and the tonnage has rapidly increased. The grade of the ore is about 3% copper. The details of the mill construction have been settled and the design will be finished as soon as possible.

In the construction of the bedrock dam in Pinal creek by the Old Dominion Copper Mining & Smelting Co., considerable trouble has been experienced from quicksand while making the excavation and it was necessary to timber and lag the trench to bedrock. A section of 60 ft. on the east is already completed.

**Bisbee.**  
There has been little of interest the past few weeks in the Warren district. All the operating companies are keeping at work along the same lines as in the past six or eight months.

The Hoatson shaft of the Superior & Pittsburg Co., being sunk from the 1,200 level, has encountered some good ore on that level, consisting of oxides of copper and native copper. The extent of the ore body has not yet been determined.

The Copper Queen Co.'s new ore handling system at the Sacramento shaft is about completed, but it has not yet been tested, as the ore raising apparatus has not yet been completely installed. An electric pump has been installed on the wet level of the Car. The new ore cars for the underground hauling have arrived, but have not yet been taken underground. The hoist at the Sacramento has been installed, but is not yet ready for operation on account of the delayed arrival of the oil pumps to be used in connection with the brakes.

At the Shattuck-Arizona the company is keeping steadily at work on prospecting and exploratory work underground. The 600-ft. drift tunnel still continues in mineralized ground.

Manager Henry Hamblurg of the Princeton Copper Mining & Smelting Co., operating in the Huachuclas, states that all work has been discontinued for the present, but that operations will probably be resumed in a short time.

Two carloads of concentrates were shipped recently from the Congress mill at Tombstone to the Saco smelter, val-

ued at \$14,000, being the result of the recent run of the mill.

The Copper Queen Co. at Douglas has started up two more converters and another furnace in the near future.

At the Calumet and Arizona smelter all the furnaces are in operation. The company is pushing the construction work according to plans adopted a year ago for doubling the capacity of the plant.

With the completion of the installation of the large pumps by the Tombstone Cons. Mines Co. on the 1,000 level in the Tombstone mines, the pumping equipment there will have a capacity of 8,500,000 gals. every 24 hours. The pumping system in these mines is the most extensive in the southwest. These properties are rich in ore, but until a short time ago great difficulty was experienced in reaching the ore on the lower levels owing to the constant inrush of water. With the complete pumping system in operation no further trouble on this score is expected.

20 miles west of Bishop. A series of 11 parallel veins from 10 to 30 ft. in width course northeast and southwest through a porphyry and granite formation. The ore is a clean quartz closely following the walls with a porphyritic gangue intervening and that carries some values. The average value of all ore is above \$25 to the ton. The ground is a tunnelling proposition and under the superintendency of J. M. Taylor over 6,000 ft. of underground work has been performed, including one crosscut tunnel of over 600 ft.; one drift 700 ft.; one drift 400 ft.; another of 300 ft. and an upraise of 450 ft. A crosscut tunnel is being extended in an endeavor to cut the Granite mountain vein generally, considered to be the mother lode. The tunnel has been advanced 125 ft. from Dry Bone vein, making a total length of 350 ft. About 50 ft. from the Dry Bone a large vein was cut with ore bodies equal in width and value to the others, and 45 ft. farther another was encountered. It is estimated that an ore reserve of several million tons has



Stamp Mill and Cyanide Plant, Casa Diablo Mine.

The New York-Arizona Gold & Copper Co. at Clifton is pushing development work and at present is employing 32 men. The company has decided to do more sinking in the future than it has done in the past. The company now has ample funds with which to continue development work for some time, but it is the intention to erect a small gold mill in the near future by which it is expected to provide funds without selling more stock.

The Pinto Creek Mining & Smelting Co., on lower Pinto creek, Cochise county, is working a force of 18 men and is using two machine drills in driving the lower tunnel which will soon cut the main lead on the property.

## CALIFORNIA.

The Casa Diablo group of 17 claims is located in the Sherwin district, about

been opened up with values ranging from \$8 to \$100 to the ton.

The property is equipped with an electric plant for power and light, a 10-stamp mill, a Frue vanner and a Wilfley concentrator. Water is piped eight miles from Rock creek in Nevada. B. F. Brazee, the president of the company, recently brought to Bishop a brick of gold weighing about 296 ozs., a partial cleanup from the plates. The company has 10 horses hauling concentrates to the railroad for shipment to the smelter at San Francisco. President Brazee is of the opinion that, from the changing conditions of the ore on advancing deeper into the mountain resulting in increased rich slimes, the present method and possibly the entire system of reduction will have to be changed to prevent loss in the tailings. The tailings are being impounded and stored for future handling. With this end in view conditions are be-

ing carefully watched and studied, to avert costly mistakes. The general office of the company is in Chicago. The officers are: R. F. Brazee, president; C. A. Fohrman, vice-president and general manager; E. R. Lamblin, secretary and treasurer.

The Chautauqua Development Co., 3/4 miles from the same district, owns a group of 17 claims developed by a 300-ft. tunnel and a 60-ft. shaft. Values vary from \$5 to \$100 to the ton. Dr. J. A. Walls of Richmond, Ind., is president and A. J. Overman, secretary. J. M. Taylor is superintendent.

The Red Rose group of claims, owned by Eli Rudolph and bonded to M. T. Stovall and the Black Canyon Gold Mining Co., are in the Bishop district of the White Mountain range. Upon and near the surface of the Rose group have been found some very rich specimens of gold. The ledges are closely defined and tunnels are being run into the mountain to intersect them at a depth of several hundred feet. One tunnel is now in over 200 ft.

The Black Canyon mine is much further along in development, the results of which have been favorable. Manager Thomas A. Varden is driving a tunnel along a true fissure vein leading to the center of the mountain 2,000 ft. below the apex. Alongside of this fissure is 30 ins. of very rich ore.

The Uleche Mining Co. of Bishop, about to be incorporated, owns in the Uleche country, beyond the White mountains, in Nevada, a group of 3/4 claims. The mineralized portion carries values in lead, silver and copper. A tunnel, in 50 ft., cut 43 ft. of ore. A drift of 27 ft. gave 50 to 70% carbonates of lead, and 25 ozs. silver to the ton. Over 1,000 tons of shipping ore is now available. W. W. Patterson of Bishop with associates, principals in this company, are also owners of 30 claims divided into four groups.

Eight miles northeast of Bishop are located the 14 claims of the Southern Belles Mining Co. of Bishop. This property has produced over \$250,000. Forty miles of development work have been done. The equipment includes a 10-stamp mill and an electric plant for hoist and air compressor.

The Inyo Mines Syndicate of Bishop has been organized for the purpose of advancing the local mining industry of Inyo county. The officers are: W. W. Patterson, president; M. Q. Watterson, vice-president and secretary; W. Gillette Scott, general manager.

The Bishop Creek Gold Co., Gaylord Wilshire of Los Angeles, president, has valuable and extensive claim holdings in Inyo county. Running through the property is a vein of sulphide ore; outcropping 10 ins. on the surface that has been prospected with a diamond drill to a depth of 160 ft. At the surface, values were from 50 cts. to \$30 to the ton; at 56 ft. the vein was 1 ft. wide and averaged \$11.20 in gold to the ton. For the distance from 115 ft. to 160 ft. depth, assays of every 2 1/2-ft. section gave an average of \$13.08 for the entire 45 ft., the last 30 ft. averaging \$18.25 to the ton.

During 1907 the company received from sale of its stock \$88,510.10, and expended for development machinery and improvements \$91,107.33. It is now planned to erect a mill and, during its building, to continue diamond drilling night and day.

During 1907 the company constructed 1,000 ft. of ditch 5 ft. wide by 5 ft. deep; 150 ft. of flume; a 16-ft. pen stock and put down 1,060 ft. of 12-in. hydraulic pipe; 1,400 ft. of 2-in. main, conveying water from the power house to the camp, which carries a pressure of 160 lbs. to the inch. The power plant has one 4-ft. Pelton water wheel, one Replage governor and one 14 by 14-in. straight-line 2-stage Leyner air compressor, complete with air receivers, connected with 1,200 ft. of 4-in. air main to the workings at No. 1 tunnel. The assay laboratory is very complete. Paul E. Lodge is general superintendent.

#### Benton.

The Standard Investment Co. of Springfield, Mass., has among its subsidiaries the Blind Springs Hill Mining Co., which, during the last two years, has taken over the old time property known as the Blind Springs Hill mines, from which over \$600,000 has been mined since 1864. The ledges, or veins, are true fissures cutting through the granite, and vary in width up to 2 ft., the pay streak of high-grade ore being from 2 to 6 ins., with values largely in silver. Until this company began operations, less than a year ago, the property has lain idle for 15 years or more. The new work, as begun and being carried on under the management of C. E. Jullin, is the driving of a 300 ft. tunnel and the starting of another to be driven 1,300 ft. A crosscut on the latter will be made at 800 ft., which will give a depth of 1,500 ft. below the surface on the main vein. In driving on the new work a pocket of rich silver-gold ore with some copper was found. The average depth of workings is 300 ft. and the veins are about 400 ft. apart. Altogether there are at least two miles of underground workings. It is probable that a good sized smelting plant will be erected within a year. The last shipment of four narrow gauge cars was \$290 to the ton in value. Thirty men are employed upon and about the property. L. S. Brown of Springfield, Mass., is president and C. E. Jullin, general manager.

The Queen property, comprising 14 claims, is another proposition owned by the Standard Investment Co. The ledges are in a rhyolite formation. The ore is silver sulphides and ruby silver with values from \$100 upward to the ton. There are five miles of underground workings. Development is in progress.

At the camp of Skookum the Standard Investment Co. owns the Skookum group of 10 claims and the Arcadia group of 13 claims. These groups are 1 1/4 miles apart. The formation of the Skookum group is granite, with porphyry dikes and ore a regular quartz associated with quartz porphyry. The ore is low-grade and free-milling. On this property is a series of veins, all from 1 to 2 ft. in width. The Arcadia veins are of white quartz with gold and silver values.

Probably the most promising proposi-

tion of all the holdings of the Standard Investment Co. is that on the west side of the Colorado river, in Riverside county, 55 miles below Needles. A tunnel is in 180 ft. and the average value in the breast of the tunnel is said to be \$450 gold and 60% copper. Development is in progress. In time a smelting plant will be erected as fluxing material is abundant.

## COLORADO.

### Cripple Creek.

The Cripple Creek camp made a heavy output during June, aggregating 64,160 tons valued at \$1,291,550. The average values of ore treated ranged all the way from \$2 to \$65 to the ton for the different plants.

The Moon and Anchor dump on Gold hill, formerly considered of little value, is now being worked at a profit by Thomas McCall and associates, leasers. They are stripping one car a day. The ore has increased in value as greater depth has been gained, from \$8 to better than \$14 to the ton. The ore is now being sorted and the first carload of this sorted ore has been shipped and is expected to run about \$20 to the ton.

Operations have been resumed on the Maggie property on Gold hill after two years of idleness. The first shipment to the mill was of 1 1/2-oz. grade. A streak of very rich ore less than 2 ins. wide has been opened up at a depth of 250 ft. and is under development. This property is under lease to George Collins.

An electric hoist has been installed by Baker & Co., operating on the Comanche Plume on Battle mountain. A 4-ft. vein of about \$20 to the ton is being worked and shipments will soon be resumed.

It is reported that extensive development will be begun on the 900 and 1,000 levels of the Ajax property on Battle mountain on company account. A number of likely looking ore shoots have been exposed which, it is thought, will develop into good paying ore bodies. A number of leasers are doing profitable work on Ajax ground. Sam McDonald on block 3 at a depth of 150 ft. is working an ore body 2 ft. wide that is returning from \$50 to \$60 to the ton. He is shipping an average of three cars every two weeks.

A strike of what is believed to be a branch of a new ore body has been opened about 200 ft. from the Gold Coin shaft of the Granite property on Battle mountain at a depth of 820 ft. Assays have shown values of from \$18 to \$34 to the ton.

The starting up of the Trilly mill on Bull hill has been delayed for a few days by the necessity of making several slight changes in the machinery. The mill will handle 100 tons per day of low-grade ore.

### Denver.

The Revenue Extension Mining Co. is to do extensive development on its Star group in the Peric district. Operations will be carried on through the Revenue tunnel and it is expected that regular shipments of high-grade ore will soon begin. The company intends, eventually, to extend the Kelly crosscut to cut the Star vein at a depth of 200 ft. below the deep-

est workings of the Revenue. It is expected that many ore shoots will be discovered at the greater depth. At a recent meeting of the incorporators of the company the following officers were elected: Judge R. H. Blackman, president; Thomas Cunningham, vice-president and general manager; Wm. A. Maxwell, secretary; John J. White, treasurer.

Some heavy shipments of fairly high-grade ore have been made from the Santiago mine at East Argentine in the upper Clear Creek district. The ore bodies are said to be increasing in size and values with depth.

The Rio Dolores Mining Co. at Burns is working on the crosscut which is in 200 ft. from the portal of the main adit. This crosscut is being driven on a vein showing values in gold, silver and lead. There are also stains of copper. The vein will be thoroughly exploited.

General F. J. Pienars and son, T. J. Pienars of New York will work the Hecla Wonder and Sterling groups in Burrows Park. Work has already been begun on the Stirling. The mill on the Hecla Wonder will be overhauled and an up-to-date process installed. Over 500 men will be employed on the two properties this season.

The Hecla mine and mill are now operating at a normal capacity of 350 tons per day and the product is being shipped to the smelter at Sahla. A force of 140 men is now at work and ore is being mined on the 600 and the 900 levels. A double-compartment shaft to the deep level will be begun this summer.

The Swarthmore Cons. Mining Co., operating an extension group of claims on Spencer mountain at Eldora is still at work driving the Swarthmore tunnel, which is now in 800 ft. from the portal on Boulder creek. It is to be driven 340 ft. farther to cut the Enterprise lode. Much water is coming in at the face. A 24-in. Ingersoll power drill is being used. While drifting is being done on the Enterprise vein, the tunnel will be extended to cut the entire system of veins on Spencer mountain.

An 8-in. streak of smelting ore assaying 9.3 ozs. gold, 50 ozs. silver and 7.4% in copper has been opened in the No. 2 shaft of the Star of the West mine in lower Russel gulch. Machinery has been installed and development commenced.

A body of ruby silver ore from 2 to 3 ft. wide has been uncovered on the Actua vein of the Capital mine. A shipment is reported to have returned \$305 to the ton in gold and silver, principally gold. The mill is running night and day and a heavy tonnage is being treated.

## IDAHO.

Mullan.

During a recent official visit to the Coeur d'Alenes, State Mine Inspector Robert N. Bell stated that in spite of the opinion that the winter season had been dull, the district had done better than several others, and that the three largest mines had continued to make a large yield of high-grade mineral; that the large lead-silver producers are in good condition for a large future output.

The first shipments for the year from

the Morning mine have just been made. The mine and mill are now working at full capacity. The mine is producing about 1,000 tons of crude ore per day. The property is one of the best equipped of the Federal mines.

The Snowstorm copper mine has resumed shipments of crude ore to the smelters and now employs about 200 men. The mine has been closed for several weeks on account of the inability to secure cars.

At the annual meeting of the stockholders of the Leslie Mining Co. it was decided to construct a new tunnel on the property. This tunnel will be 5,000 ft. in length and will give a vertical depth on the vein of 1,650 ft. A 10-drill air compressor and a drill sharpening machine will be installed at the site of the new tunnel. The following officers were elected: Wesley Everett, president; H. W. McLaughlin, vice-president; H. J. Rossi, secretary-treasurer.

Work on the Bullion mine, across the main range east from Mullan, has been resumed and a crew of men is preparing the property for active work. The intention is to sink the shaft an additional 100 ft. and to drift on that level. The vein, so far as exposed, shows several feet of good copper ore. James H. Taylor of Wallace is manager.

The Alma Mining Co. will hold its annual meeting in Wallace on July 7. The property is located in Deadman gulch near Mullan. A. J. Davidson of Chicago is secretary. The property is fully equipped with air compressor and other machinery, and is located in one of the best mineral belts in the district. Considerable tunnel work has been accomplished with encouraging results.

The Copper King Mining Co. has moved from the head of Sonora gulch on the Burke side of the range to the west fork of Deadman gulch, where a new tunnel has been started. The wagon road to the new camp has been completed and all the necessary buildings will be up inside of 60 days. The new plant is expected to accomplish rapid tunnel driving. The new boarding house and compressor house to be erected will each be 60 ft. by 50 ft. in size.

Wallace.

Preparations are being made to ship a sample car of ore from the Gray Copper property, near Osburn, to the smelters. Manager W. H. Herrick states that six tons of sorted ore is now on the dump, and as soon as a carload has been taken out it will be shipped. The samples which have been tested show values of from \$50 to \$80 to the ton in copper, silver and gold. The ore is about 1 ft. wide in the discovery shaft. It is the plan to open the vein at greater depth as soon as possible.

The Golden Chest Mining Co. of Murray has secured patent to the Hot Stuff group of six claims in Summit district.

The Nipsic Mining Co., owning the Father Lode group, near Murray, has encountered 3 ft. of good galena ore in a raise connecting the first and second tunnels. The Nipsic is a new company composed of Wallace and Spokane men.

The Anchor Mining Co. of Burke has made an important discovery of ore on

the Diamond Hitch claim located between the Mammoth and Hecla mines. The property has been worked unsuccessfully for several years by tunneling. The company recently started sinking in an old shaft from which several cars of ore were shipped some years ago, and has opened 2 ft. of rich lead ore with very high silver values. Mike Maher of Burke and Evan Evans of Spokane are the largest stockholders.

The Hecla Mining Co. has declared its June dividend, amounting to \$10,000. The total paid this year is now \$60,000 and the total to date \$1,280,000. The mine is now working full capacity and shipping 350 tons of ore per day.

The Monitor mine, across the Montana divide, bought about two months ago by the owners of the Success, is being opened up. The first work will be the continuation of the 400-ft. shaft to the 700-ft. level, from which point a tunnel will be run to the vein, as the main working level. The Monitor has shipped \$175,000 of ore.

Steps have been taken to drive a long tunnel on the Leslie mine, from near railway level, which, it is said, will gain 700 ft. greater depth than the present working tunnel.

The Monarch Mining Co. has given a two years' lease on its property to a newly formed corporation headed by E. P. Spalding, and known as the Coeur d'Alene North Fork Mining Co. According to the terms of the lease \$175,000 in cash and 350,000 shares of the stock will be given in payment. The debts of the Monarch, contracted for development since January 1, will be paid by the new company and \$10,000 of work is to be done this year. The lease provides for double this amount of work next year, and that work may not be suspended for more than 60 days at a time.

Work has begun on the 3,600-ft. tunnel for the Copper King Mining Co. Development has been largely confined to upper levels where tunnels and upraises have disclosed a large body of excellent ore. Some development was done last summer. The mine has a 5-ft. ledge said to assay 28% lead, 18 ozs. silver and 5% copper.

It is reported from the Southern Hercules mine, that rich carbonate ore has been discovered in a shaft sunk on an outcropping ore shoot at a depth of 190 ft. It is stated that a first shipment of ore will be made early this month. Sinking on the shaft continues. Stations will be cut at a depth of 500 ft. and a working tunnel run.

## LAKE SUPERIOR.

COPPER.

Houghton, Mich.

The north drift on the 350 ft. level in No. 2 shaft of the Ojilway has been discontinued and the drill transferred to the shaft. The drill in the south drift will also soon be moved to the shaft. With both drills at work rapid progress will be made in sinking. When a depth of 500 ft. has been reached another crosscut will be started. The ground now being penetrated by the crosscuts shows less leaching



than at first. The north drift is in mineralized rock and the face shows considerable copper. No. 1 shaft is down 225 ft. and two drills are at work. The first crosscut will be started at the 500-ft. point.

The Almeck Mining Co. is putting down diamond-drill holes near the northern boundary of its property preparatory to sinking a shaft between the Almeck and Mohawk boundary line.

The north drift on the 200-ft. level of the Helvetia is in ore for 237 ft. The ore runs 2½ to 10% copper and will probably average 4½ to 5%. Between the 200 and 300-ft. levels a crosscut was driven from the winze, and for 16 ft. to the west is in ore which averaged 18%, giving a width of from 30 to 40 ft. to the body at that point.

On the 300-ft. level a winze was sunk from the south drift and was in high-grade sulphide ore all the way, but was discontinued on account of water. The shaft is now being sunk to the 400-ft. level, from which point a crosscut will be run to the southeast to catch the body found on the 300-ft. level.

The shaft rock house at the Keweenaw is about finished. The rock crusher and the rock-house engine have been received. Preparations for the shipment of rock are about finished under ground and shipments will probably be begun before the end of the month.

## IRON.

### Marquette, Mich.

While the Jones & Langhin Steel Co. will continue the experiment with the grab and overhead carrier system at its Grant mine at Buhl this season, and while it may be perfected so as to serve adequately in stripping work, the apparatus is not generally considered sufficiently flexible in making up cargoes for shipment from various grades at different points.

It was formerly believed that it would be unprofitable to remove much more than 30 ft. of overburden, but now as much as 90 or 100 ft. of surface material is being stripped, and the limit seems not yet to have been reached. At the Biwabik mine, which has produced 8,200,000 tons of ore to date, the stripping so far done amounts to 4,500,000 cu. yds. At the Mountain Iron, which has sent out 17,000,000 tons of ore in 15 seasons, nearly 5,000,000 cu. yds. of overburden have been removed.

Stripping amounting to 4,000,000 cu. yds. has been done the past three years at the Steel Corporation's Monroe-Tenor property. The Steel Corporation from its mammoth Hull-Rust at Hibbing, Minn., with the Burr opened on the same deposit, has already removed 8,500,000 cu. yds. of overburden. As the ore body at this point extends for several miles, the amount of stripping yet to do can be realized.

Some tremendous stripping is being done at the Steel Corporation's new properties at the western end of the Mesabi. There has been removed at the Canisteo, Walker and Holman mines within the past two and one-half years an aggregate of approximately 6,000,000 cu. yds. of overburden. Eventually the three pits

will be merged into one, making an excavation about three miles long. It is quite certain that the formation extends westward to the Mississippi river, and that in the intervening area more mines will be developed. The deposits where now being opened average about 170 ft. in thickness and are overlaid with 85 ft. of drift. It will be possible to ship about 25% of the ore as it lies in the ground, the remainder must be washed to remove the sand with which it is mixed. The washing does not remove the phosphorus. As it lies in the beds the ore runs from 30 to 50% metallic iron.

Millions of tons of ore will be mined in this western Mesabi district annually, and the washery at which the product will be treated will be located on the east shore of Trout lake and will cost, it is stated, approximately \$1,500,000. It will handle the material by gravity, in and out, and at the dump the waste product will be washed into the lake by a system of water jets.

The Shenango Furnace Co.'s Shenango property at Chisholm has been added to the open-pit mines, and is now utilizing a steam shovel to load ore direct into cars. Up to this summer the Shenango was an underground proposition. Stripping has been in progress for nearly a year. The overburden is exceptionally heavy, and the cut is a deep one.

As is the case in most of the districts of the region, conditions continue abnormally quiet in the Crystal Falls district, Menominee range. The Corrigan-McKinney Co. is shipping from stock piles, but there has been no resumption of work at idle shafts. The Steel Corporation's Mansfield mine is still being worked on half-time and is sending out no ore. It also has a crew at work at the South Mastodon and is test-pitting and drilling the tract.

At the South Dunn property, the Buffalo & Susquehanna Co. is preparing to sink the shaft to the second level for the purpose of further testing the deposit cut some weeks ago at a depth of 180 ft. This ore is of very good quality and apparently lies in a very considerable body.

In the Iron River district of the Menominee the Steel Corporation is engaged in considerable improvement work at its Doherty mine. The engine house is in progress of reconstruction and will be equipped with a more powerful plant of machinery. A new engine and two 8-ft. hoists have been received.

The new shaft at the Algoma Steel Co.'s Millie mine at Iron Mountain has been bottomed at a depth of 200 ft. It is located near the old shaft and taps a new lens of high-grade ore. Shipments to the furnaces at the Canadian Soo will be started shortly.

Fires are to be banked next week at the Lake Superior Iron & Chemical Co.'s furnace at Manistique.

Shipments from the mines at Isipemine and Negaunee, Marquette range, are quite active, some 10 steam shovels being engaged in loading ore from stock piles, but there has been no increase in underground operations and materially fewer men are employed than at this time a year ago.

## MISSOURI-KANSAS.

### Joplin, Mo.

The zinc stock in the district is very limited this week owing to the shutdown of several large plants and the active buying of ore. Many of the smaller operators are forced to sell to meet the weekly payroll and this will cause a weakness in the market as a good many tons can be procured from this source.

Smith & Co., up on the Bathe land, have opened a good deposit of zinc at 120 and 142 ft. The ore is free, occurring in spar in the upper runs while the lower runs are in flint. The ground has been developed by running a drift 200 ft. work being done at both levels. After further development a 100-ton concentrating plant will be erected. Fish & Co., holding a lease in the same district, have developed a good ore body, also occurring free in a flint formation. The ground will be thoroughly developed and a 100-ton mill will be built. The Pumpkin Head Mining Co., holding a 10-acre lease upon the Bathe land, has just completed a new concentrating plant, which will be ready for operation within a week. A number of drill holes have been sunk showing a large ore deposit from the 100 to the 150 levels. The development work has all been accomplished during the last few months and a large amount of drifting was done before the erection of the mill.

Chester & Co., also holding a lease on the Bathe land are developing a mine north of the Mollie O. tract. The shaft is being sunk and for the past few days has been penetrating very rich lead ore. The shaft will be sunk slightly below the 100 level where the ore occurs.

On the W. E. Johnson land, southwest of the city, the Cleo Mining Co. is opening up a rich deposit of lead and zinc from the 97 level down. A 5-ft. face of lead was entered at 97 ft., below which occurred an 18-ft. face of zinc. Ore was found still lower, but the shaft was temporarily stopped until a derrick and steam hoist could be installed. This company has not been troubled with water during the entire time of sinking, while adjoining tracts have had considerable difficulty.

The Lucky Jim, west of Joplin, has just completed a 250-ton mill, but production will not be begun until ore prices increase sufficiently to insure profitable operation. Drifting is so arranged that 15 or 20 drills can be put to work as soon as operations begin. A 65-ft. face of ore has been opened up.

On the old Jackson land now owned by Mathies brothers a new shaft has been sunk to the ore body. One shaft had already been sunk into ore and the present one will furnish ventilation as well as help in development.

The Old Conqueror mine in the Chitwood camp has been reopened after the erection of a new tailing tower and repairing the mill.

The old Tussing property in Bellville is again producing after a shutdown of some time. Previous to reopening, the ground was drained by a small pumping plant. The mill is a 150-ton structure and operates upon a rich ore body running 4 to 5% zinc concentrate.

Upon the Dinkelblader land, east of the

city, a small shallow deposit of rich lead ore was encountered in soft ground at 60 ft. Several companies are prospecting for lead in the same territory.

#### Webb City, Mo.

Jenkins & Co. have taken a lease upon a 15-acre tract adjoining the Ground Floor tract north of Webb City. A shaft will be sunk at once to intercept the drifts of the old Chicago run of several years ago. The Chicago operated a lease here and worked the ore for 200 ft. along the line of the Ground Floor. As soon as the shaft is completed the ground will all be opened up for the Jenkins Co. and a full equipment of machines will be installed ready for operation. The new company will erect a large mill.

A very rich deposit has been opened up by the Wolfheart Mining Co. in the Huesweg camp adjoining the American Beauty No. 2 and the Lincoln mines. The ore body occurred from 232 to 241 ft. in sheet ground. A large percentage of lead is found with the zinc ore. A concentrating plant is being planned.

The incline shaft recently begun by the Yellow Dog mine is down 150 ft. It is being sunk toward the west in the direction of the Red Dog mine, which is working upon the same deposit. Two other incline shafts are upon the Yellow Dog lease and furnish ore for the 1,000-ton plant operating there. The conveyor system is being used in the first two shafts, but the skip system of hoisting will be employed in the new one.

The Fullerton, an old plant in the Cartersville camp, was completely destroyed by fire a few days ago, entailing a loss of between \$5,000 and \$10,000. The Garnet mine milled its ores in this mill in addition to the ores from the Fullerton tract. During the same week the tramway and derrick of the Diamond Jack were burned, but the fire was stopped before serious damage was done to the mill. This plant had been in operation only a short time.

A rich strike is reported from the Aurora camp in the east end of the district. The find was made upon the United Zinc Co.'s ground at a depth of 60 ft. The dirt runs from 8 to 12% zinc. One shaft has been sunk and a prospect drift is now under way.

#### Miami, Okla.

There are at the present time four producing properties in the Miami camp and 15 prospective mines. Arrangements are being made to sink a number of new shafts upon new properties, which will make 18 shafts for the field all in a small area. The mine of the Emma Gordon are full. This mine has become one of the heaviest zinc and lead producers in the Joplin district, although the mill has never yet been operated to full capacity.

Two new mills are being planned for Miami to be erected at once, the Miami-Yankee and the King Jack. Both properties are well developed, having had their shafts down and drifting done for some weeks.

The Index mine made a rich strike of lead and zinc in its south drift this week. The drift was being run to further open

up the ground before the erection of a mill.

A very rich run of lead ore was discovered in the south shaft of the Buckeye mine at a depth of 105 ft. This company is erecting a concentrating plant which will handle 150 tons per shift. Two shafts will supply the ore. It is expected to have the plant in operation within two weeks.

Frank McCuddy and associates have taken a lease on the Little Maxine and will begin the development. The company is sinking a shaft.

## MONTANA.

#### Butte.

Owing to the heavy June rains the open-cut mining had to be suspended by the Barnes-King Development Co., and mining was confined to the underground workings, the faces of which have been in better ore. The June operations were about two-thirds of the normal. The increase in the value of ore has been gradual for several months. In April assays from the crushed ore averaged \$4.19 to the ton; in May \$4.26, while the first week in June the average was \$5.48 and the second week \$6.63. During May the mine was worked full time, and 26% of the men employed were engaged in development work and prospecting. Ore to the amount of 5,714 tons was mined. At the extreme north end of the south and open cut some excellent ore, coming within 2 ft. of the surface, was produced. The two ends of the Santiago ore body turned out the best ore. Development work to the extent of 647 ft. was done, 324 ft. of it being crosscutting and drifting, 110 ft. in raising and 13 ft. in sinking; all non-productive of ore. Because of the heavy rains the milling was unsatisfactory. The value of the bullion produced in May was \$20,946.85. The reports do not give an account of the company's expenditures, but it is understood that the expenses are about \$25,000 to \$26,000 per month.

Preparations are being made by the Goose Lake Copper Co. to resume work on its property near Cooke City. J. W. Martin of Butte will have charge of the work. The company has a shaft 50 ft. deep and good ore has been found from the surface down, samples assaying as high as 12% copper. The shaft will be sunk several hundred feet deeper and an adit will be driven from the side of the mountain to get under the ore bodies. In addition to the copper, the ore carries good values in gold and silver, and assays in platinum to the amount of \$60 to the ton have been obtained. The survey for the new electric road from Columbus to Cooke City passes over the Goose Lake property and within a short distance of the mouth of the proposed adit.

The Little Mina vein, upon which the Parrot Co. is doing most of its mining at present, is gradually improving. Drifting on the vein at the 1,000-ft. level has been prosecuted in both directions from the crosscut for some time, and while the ore has been good all the way, an especially fine body of high-grade ore was recently opened in the west drift.

It is announced that the Butte & New

York Mining Co., the holding company for the Butte-Milwaukee Co., has succeeded in raising money with which to resume development work. A statement of the Butte & New York Co. claims that that company is free from debt and is the owner of its property. Its relations to the Butte-Milwaukee Co. and the latter's stockholders have never been made clear to the latter. It has been announced that Butte-Milwaukee stock would be made exchangeable for Butte & New York, but the stockholders have never been notified of it. The Butte & New York Co. also owns one other claim. The other property in the group, supposedly owned by the Butte-Milwaukee, consists of the Colonel Sellers, Pollock, Bird and Narrow Gauge claims. When the Butte-Milwaukee Co. was organized an attempt was made to develop the property through the old Pollock shaft, but that was found unfeasible, and a new 3-compartment shaft was started on the Colonel Sellers. This shaft is now down 700 ft., at which point a station has been cut.

W. P. Jahn of Milwaukee, president of the Pilot-Butte Mining Co., has been in Butte for some days directing preparations for a resumption of work on the Pilot claim. A shaft 500 ft. deep was sunk on the claim before work was stopped by a lack of funds. Funds have been provided and sinking is about to be resumed.

The Copper Eagle Mining Co., a new corporation, is likely to resume development work soon. The property is situated north of Butte, and has a shaft 300 ft. deep. It is stated that the company has secured some financial backing in Kansas City and that the shaft will be sunk to a depth of 1,000 ft.

The Butte-Ballaklava Co. is still engaged in drifting and crosscutting on the 700 level and a small quantity of ore has been taken out in the course of the work.

#### MISCELLANEOUS CAMPS.

**Libby.**—The Victor Emanuel Mining Co., 10 miles south of Libby, is putting in a large Sigdy stove and about 600 ft. of galvanized iron piping for use in ventilating the working tunnel.

It is stated that the Big Eight mine, 18 miles west of Libby, has been sold to a French syndicate for \$20,000 cash. The property has had considerable development. A concentrator and other buildings will be built and machinery installed. It is hoped to have the mill running by late next fall.

**Salters.**—It is stated that work will be resumed on the property of the Monitor mine. This mine is under option to H. F. Samuels. It is worked through a shaft and has produced \$250,000 worth of ore. O. H. Linn is in charge of operations.

**Truy.**—The Suller Mining & Milling Co. owns a group of eight claims in the Whitefish district developed by a shaft down 125 ft. from which is a 40-ft. crosscut. The shaft is in ore all the way. The equipment consists of an air compressor and several buildings. At the surface the ore was galena, which, with depth, ran into copper ore assaying 21% copper.

## NEVADA.

## Tonopah.

Conditions at the Tonopah Extension mine are reported to be showing steady improvement as work progresses. Large and well defined ore bodies are being developed on the 550 and 600 levels west of the shaft. It was necessary to temporarily suspend work in the west drift on the 600 level on account of the presence of an unusual amount of gas. Three raises will shortly be made in ore to connect the 600 level with the 500. These will serve both for mining and for ventilation. The ledge in the east drift on the 600 level is showing steady improvement.

Prospecting to the Mizpah fault is being continued by Superintendent Brady of the Tonopah Belmont. The work of driving the main east crosscut on the 1,000 level is being pushed as rapidly as possible and stringers carrying values are constantly being cut. Prospecting in the southern section has resulted in some very good showings. Most of the work on this property has been spent in developing and opening up the ground and in putting the mine in shape for future production.

The Tonopah Mining Co. is making good progress with the work of sinking its 3-compartment Mizpah shaft, which is down to nearly 1,000 ft. When the 1,300-ft. point has been reached extensive prospecting will be done. Sinking of the Red Plume shaft from the 1,000-ft. point will be started as soon as the machinery arrives. This shaft will be carried down to a depth of 1,500 ft. About 3,000 to 3,500 tons of ore is being mined per week, part of which is being stocked at the mill as reserve, but most of it is being stamped. The mill has been running at very nearly full capacity and recently during a single week crushed 2,935 tons of ore having an average value of \$23 to the ton with an average extraction of 88%. The total bullion shipment for that week was \$62,350.

The ore body recently struck in the new shaft at the West End is showing up larger as work continues. Over a carload of excellent ore has been taken from the shaft during sinking. The shaft is now down to the 400-ft. point, where a station is being cut. When this is completed, drifting on the vein will be begun and the ore body opened up.

## Goldfield.

Preparations are being made for sinking No. 7 shaft at the north end of the Alpha claim of the Goldfield White Rock Mining Co. to the depth of at least 700 ft., when a drift will be started in a southeasterly direction to the boundary of the company's property and further through the property of the Goldfield Kawagum Mining Co. Shafts Nos. 5 and 6 will be sunk to the same level as No. 7 and drifts started northwesterly to cut the drift from No. 7 shaft at a depth of about 700 ft. An electric pump has been installed at a station cut at the 485-ft. point in No. 7 shaft. This shaft is now in good condition for its entire length and a 40-ft. head frame has been erected. Captain Thomas Hooper is manager of this company.

The St. Ives Leasing Co. is finding in-

creasing values on the ledge encountered on the 500 level and work on it will be continued. A crosscut is being driven in a northerly direction which, it is expected, will soon cut the ledge found at the bottom of the shaft.

The Goldfield Daisy Syndicate is enlarging its shaft to three compartments to a depth of 400 ft. and shipments will be resumed at once. Extensive work is under contemplation. Work on the details for the construction of the proposed mill are under way.

Arrangements are being made to sink the shaft on the Diamondfield Red Mountain Mining Co.'s property another 100 ft. The shaft is in a large body of milling ore at 300 ft. and it is thought that it will be of a shipping grade at 400 ft.

The Goldfield Cons. Co. is to soon resume sinking its Clermont shaft on the Jumbo. This shaft will eventually be used for mining all the ore on the Mohawk, Red Top and Laguna mines on a common level. The shaft is now down 385 ft. and will be sunk to the 850 level where a station will be cut. The Mohawk shaft, which is down 600 ft., will not be extended, but all ore mined between this point and the 850 level will be hoisted through the Clermont. The Mohawk shaft will be used for handling the ore between the 350 and 600 levels. Much other development work has been done and a large amount of ore is opened up which will be sent to the new mill now under construction.

## Manhattan.

The Lemon mill, after a long period of idleness, is to be put in condition for operation. This mill has 10 stamps and a cyanide plant. The capacity is 10 tons daily.

The Security Reduction Co. at Belmont is installing much new machinery, including a 190-h. p. Westinghouse and Weber gasoline engine and a Fuller mill with amalgamating and concentrating tables, which will bring the capacity up to 50 tons daily.

Work has been resumed on the Thelma and a 2-ft. body of rich silver has been opened up.

A 1-ft. ledge has been struck in the drift at a depth of 175 ft. on the Moore-Vulcanovich lease on Union No. 9, about 30 ft. in. The ore is said to average about \$50 to the ton.

## Searchlight.

A strike of some importance was recently made in the shaft of the Searchlight-Midas at a depth of about 280 ft. The average values obtained from the samples taken are reported as about \$7 to the ton.

An equipment of all necessary machinery has been purchased for the Quartette Extension. This will include a 25-h. p. hoist which will make it possible to sink the shaft from the 300 to the 500 level. It is thought the machinery will be in operation within the next 60 days.

A contract has been let to sink the shaft in the Dominion camp in Eldorado canyon down to the 800 level or 320 ft. deeper than at present. The contract also calls for 200 ft. of lateral work.

The Denver-Searchlight Co., operating the Jewel and Cowboy claims in the Crescent district is sinking a shaft now down 25 ft. in which the values have increased from 80 cts. at the surface to \$15 to the ton at that depth.

## Round Mountain.

Ground has been broken for a mill on the Solid Gold lease on the Daisy property and the construction will be started at once by the contractor C. E. Rice. The mill is to be a Merrill stamp. Part of the machinery has already arrived and it is expected that the mill will be ready for operation inside of 90 days. Sixteen men are at work in the mine sinking and crosscutting. Five hundred sacks of high-grade ore and a large dump of milling ore are awaiting treatment.

There is some talk that the Round Mountain Reduction Co. will increase the capacity of its custom mill by adding new machinery and making some other changes. The present mill is now treating from 25 to 30 tons of ore per day and is said to be making a saving of from 95 to 98% of the gold. Charles H. Nazro is vice-president and general manager of the company.

## OREGON.

## Grant's Pass.

The Windy Hollow mining district is again active. The most important mining claims have been purchased by Nevada mining men and will be developed by them.

J. J. Reiley and associates have recently purchased the Jumbo, Butte and other claims of the Loftus group. The consideration is not given to the public, but the properties were held at \$200,000. Sinking on the Butte has proven satisfactory. The main ledge varies from 20 to 50 ft. Besides the main ledge, several narrower and richer veins have been struck. The ore is nearly all milling. The district is located near Lake View, in southeastern Oregon. The first discovery in the district was made two years ago by Loftus brothers, who took out a small fortune from the surface prospects within a few weeks and later deeply developed the claims. The strike on the Jumbo caused a considerable rush to the district, and a number of claims were located, several of which later proved to be excellent properties. The quartz ledges of the district are different in character from the usual lode veins in southern Oregon. The ore resembles the Nevada quartz.

The hydraulic placer mines of southern Oregon have nearly all completed their annual spring cleanup. Almost \$750,000 has already been brought in for exchange at the banks, or for direct shipment to the mint, and it is believed that the total output of the placer mines of southern Oregon, for this season, will be close to \$1,000,000. Several of the large properties of the district, notably the Sterling, Deep Gravel, Columbia and Royal group, will clean up from \$20,000 to \$60,000 each. Besides these, a number of the smaller placers will yield from \$5,000 to \$10,000 each. Considerable platinum will also be cleaned up with the placer gold.

The platinum is caught in the sluices with the gold, and is secured by careful panning in vats and tubs of still water.

As the hydraulic placer mines of southern Oregon are never-failing in their returns, and as the gold passes the same as coin, it goes immediately into the channels of trade, and insures good times for this section, irrespective of the financial condition of the country at large.

The Great Northern gold mines in the Blaine River country, Linn county, has recently been sold at sheriff's sale to Colonel J. M. Williams of Eugene for \$1,875, on two executions from Linn and one from Lane county. The mines were originally capitalized at \$1,000,000.

The stamp mill on the Virtue mine in the Baker City camp is still in continuous operation and the prospects are that it will continue in operation for an indefinite period. There is a 20-years' accumulation of ore on the dump which is being worked at a profit.

Arrangements are being made for the resumption at the Black Jack mines. The working tunnel will first be extended to cut veins ahead and those already cut will be more thoroughly exploited.

Operations at the North Pole mill at Sumpter have been resumed. The mill has been completely repaired and more modern appliances added. Development work in the mine is being carried on.

## SOUTH DAKOTA.

### Deadwood.

As a result of the thorough sampling of the Oro Fino property of the Golden Reward Mining Co., on Bear Butte creek, it has been decided to resume operations at that mine. The property was formerly operated by different people for its free gold ore. The tailings were allowed to go to waste. The ore was shipped to the old Deadwood smelter. It is the present intention to take the ore from a large ledge that is opened up in a tunnel near the old hoist, one-eighth of a mile from the railroad. It will then be shipped to the smelter at Denver as the grade of the ore is too high for cyaniding. Commencement of work on the Oro Fino is expected to result in much other work in that district. John Tortette will be in charge of the mine.

John Simm has started work on the Victoria property on Squaw creek with a small force of miners and will develop the ore bodies until they have reached the stage for treatment in the mill. It is the intention to increase the force from time to time and in a few months to have the 200-ton cyanide mill in operation. This mill has been operated but little since its erection two years ago, but the Victoria has several good ore bodies that only require proper development to make them yield sufficient output for the mill.

Through an agreement between the contending stockholders and interests connected with the Altia Mining Co., formerly the Puritan Gold Mining Co., the long standing difficulties have been amicably adjusted and it is expected that the property in Strawberry gulch will soon again be operated. The bond holders

have agreed to surrender their bonds and take stock, the money derived from the sale of stock to be used in the further development and operation of the property. Some changes and additions will be made to the mill and it is hoped to have it in operation this summer. The company owns a large acreage in Strawberry gulch on which a shaft has been sunk to quartzite and located the main body of low-grade ore from which the mill is to be supplied.

The Gordelia Mining Co., whose property of 400 acres is located in the Rochford district south of here, in Silver and Smith creeks, is planning to raise more money to continue work in the fall. The property has been considerably developed, first by the old Columbia Mining Co. and later by the Gordelia under Superintendent Kearney. The company has a 10-stamp mill where several successful tests have been made on the ledge of fair-grade ore, which is considered a good milling proposition. A larger mill will be erected when the development warrants.

## UTAH.

### Salt Lake.

The management of the Peacock Cons. Copper Co., whose property is in Beaver county, is drifting on a fissure from 2 to 5 ft. thick on the 100-ft. level. The drift has extended 70 ft. toward the east. The ore averages 23 ozs. silver and \$1.60 gold to the ton and 42% lead.

A new ore body 15 ft. wide and of unknown height and length has been opened up on the May Day mine, in the Tintic district, between the 200 and 300 levels. This ore body is on the south side of the property where no exploration work has previously been done and the discovery is therefore considered of importance. Work is being carried on in six or seven faces of ore in which work was in progress before the mine was closed down last fall, in addition to the new ore body. The company's mill is being run at full capacity and is treating 80 tons of ore per day, which is more than it ever handled before. Shipments are being made at the rate of one carload per day.

The Bullock mine in the Tintic district is to have a new shaft on its Sage Brush claim, where a large, heavily mineralized vein is passing through a ledge of porphyry and lime. Assays of the ledge matter show that gold, copper, silver, iron and lime exist. The presence of lime is new for that end of the district. There is a good showing of copper and the new shaft will be pushed as rapidly as possible. Those who understand the formation think that the solid lime will be caught in 200 ft., as just north of this spot there are extensive ledges of lime with large fissures passing through them. An overflow of porphyry partially covers others.

The Mammoth Mining Co. has closed its mine at Tintic in order to make some extensive repairs. Extensive repairs will be made to the shaft and no opinion can be had as to how long this work will be under way. The company desires to have the shaft and all the workings in good condition for the purpose of taking every

advantage of the opportunities now before the company. The closing down of the property does not mean that the Mammoth Co. will not be able to send in its ores. During the past months of dull season the management has been at work extracting and stocking ores, and a splendid tonnage is now extracted and ready for shipment. It is very probable that the company will ship steadily during the entire period of repairing. The company now has three cars of ore in the local market. It was stated Tuesday that a force of about 12 men will be kept employed at the property while repairs are going on.

## WASHINGTON.

### Chewelah.

The Arzard Mining Co. owns 160 acres of patented land on Round mountain, five miles south of Chewelah, that is being developed by a tunnel, now in 89 ft. A body of copper ore 30 ft. wide, assaying \$17.80 to the ton, has been cut. The tunnel will be driven to tap the ledge. L. Bryant is manager.

The Liberty Mining Co.'s property consisting of a group of four claims, has two tunnels, one in 394 ft. and the other 150 ft., 102 ft. of the latter being on the ledge. The average assaying of the gossan is \$8.40 to the ton. J. E. Watson is president, and L. Bryant manager.

The Copper King Mining Co. is developing its property, six miles east of Chewelah, by a tunnel to crosscut the ledge 40 ft. from the United Copper Co.'s mine. The tunnel is now in 700 ft. with 300 ft. of drifting and stoping. The property is equipped with all necessary machinery. E. W. Shifely is manager.

The Copper Queen group comprising seven claims in section 6, range 36, is under development by a tunnel 280 ft. in at a depth of 160 ft. Ore was struck 115 ft. from the portal. The tunnel is being driven parallel to the ledge to strike a vein of ore showing a width of 25 ft. on the surface. The tunnel is in a soft formation and timbering is necessary. E. G. Thompson is manager.

The Black Eagle Mining Co., owning 160 acres of deeded land two miles west of Chewelah, is driving a 300-ft. tunnel, now in about 60 ft. in red slate. The values are mostly copper, but there is some free gold. G. A. Mowatt is owner.

The Windfall Mining Co. has 40 acres of deeded land five miles east of Chewelah. The upper ledge is developed by a 100-ft. shaft, all the way in ore, said to assay \$100 to the ton in gold and silver. A main tunnel, 400 ft. below the shaft opening, is in 350 ft. This tunnel will be driven 200 ft. farther to cut two parallel veins carrying values of about \$5 to the ton in gold and silver. Mark Mitchell is president and manager.

The Kruger Gold & Copper Mining Co.'s property consists of four claims and a fraction, altogether 95 acres, 21 miles from Blaine creek and six miles from Chewelah. A tunnel is in 70 ft. on the vein and a shaft is down 14 ft. The tunnel will be driven 700 ft. at a depth of 300 ft. Values run from \$7 to \$63.60 to the ton in gold, silver and copper. George A.

Allen is president and A. Kruger secretary and manager.

The Blue Star Mining Co. has acquired the property known as the Eagle mine, consisting of seven claims three miles from Chewelah and adjoining the United Copper mines. The ore bodies are found in line. The ore is lead, carrying zinc, arsenic, iron, copper, silver and gold, averaging \$26.05 to the ton. The development consists of a shaft down 240 ft., and extensive tunnels and drifts. The equipment consists of boilers, hoisting engine, buildings, etc. Arrangements are being made to install an air compressor and a gasoline hoist. Mark Mitchell is president and manager.

The Alberta group of five claims and two fractions is developed by two incline shafts, one down 60 ft. and another down 100 ft., all in ore. The ore, a sulphide, assays 2½% copper with 20 ozs. silver and \$4 in gold to the ton. A 215-h p. boiler and a 5-drill air compressor are to be installed. The group is owned by the Chewelah Copper Mining & Smelting Co., of which W. H. Brownlow is president and manager.

#### Rubric.

The Department Mining & Milling Co., operating in the Empire camp, about six miles southwest of Curlew, is developing an immense vein of ore with values in gold, silver, copper and lead. The company owns six claims in a group and is at present opening up the Iron Crown, on which a shaft is down 100 ft. From the bottom of the shaft a crosscut has been driven 60 ft., which will be extended 40 ft. further; after that a crosscut will be driven on the same level 40 ft. in an opposite direction.

In regard to the Keller & Indiana Cons. Smelting Co.'s deal for the Manila mine, it has transpired that, while the price agreed on was \$60,000, only \$500 was paid down. The company held its annual stockholders' meeting at Keller June 22 and elected a new board of directors, which immediately elected as the executive officers: R. L. Boyle, president and general manager; J. S. Badger, vice-president; Ira J. Hollenbe, secretary-treasurer; and H. Hickman, assistant secretary, the latter to remain at Keller in charge of the office there. The Manila mine croppings have been traced about 3,000 ft. in length and are from 70 to 100 ft. wide. The vein has been attacked by two crosscut tunnels, and lateral workings and ore has been found to assay as high as 4 ozs. silver to the ton and 1½% copper. An average sample across 70 ft. is reported to have assayed \$17.16 to the ton. M. C. Smith is superintendent. The company is now engaged in building a new wagon road from the Manila mine to the smelter, is arranging for a supply of coke, and expects to blow in the iron smelting furnace about the last of August or first of September at latest.

#### Concunully.

The Palmer Mountain Tunnel & Power Co., in Okanogan county, is pushing drifts on several of the veins cut in the big bore, and is now getting out ore rich in free gold from the No. 23 vein at a depth of 1,300 ft. The mill buildings are

completed and the machinery is in course of installation.

The Ruby mine, at the base of Mount Chopac, in the Similkameen district, is at present idle, awaiting the decision of the directors at Mansfield, Ohio, regarding plans for the building of a large concentrating mill at the mine, on which must inevitably depend the favorable treatment of many thousands of tons of ore already extracted and in sight in this mine. While seven carloads of very rich assorted sulphatimmonate ore were shipped to the smelters since early last spring, the main bulk of the ore is of low grade and must be concentrated on a large scale to make it pay. The vein is from 3 to 15 ft. wide. The mine has from 4,000 to 5,000 ft. of openings on the vein, including between 700 or 800 ft. of raises which connect four different leads. The main openings are a crosscut tunnel and drifts therefrom, giving a vertical depth of about 600 ft. For deeper exploration sinking machinery will be needed. The ore already extracted has been taken from the workings referred to, and very little stoping has ever been done in the mine. The Vancouver, Victoria & Eastern Railway Co. has already built a spur from its main line to within 400 ft. of the lower tunnel on the property.

The North Star group, adjoining the First Thought mine in the Orient camp, is developed by a tunnel 80 ft. in ore carrying silver, gold and copper. Assays from surface showings gave as high as \$18.30 to the ton in gold and silver. Assays from the tunnel ran as high as \$9 in gold to the ton. The company is capitalized for \$1,000,000. The officers are: George B. Siler, president and superintendent; E. A. Buchanan, vice-president; and J. B. Pickrell, secretary-treasurer.

### WISCONSIN.

Noticeable activity is shown in many camps of the Wisconsin-Illinois-Iowa field, due largely to the more favorable price of \$62 and \$64 per ton received for lead ore. As soon as the price of zinc ore is advanced there will be a general resumption of operations in all the mining centers.

#### Cuba City.

Large quantities of high-grade zinc concentrates are being produced at the Blaxter, Dall, Vandeventer and Bert mines, but only enough is being sold to relieve the overflow from the bins. All the lead that can be mined at these mines, as well as at the Henrietta and Only Wain, is being sold. The fair prices of \$62 and \$64 per ton received warranting this course.

An exceptionally heavy run of rich lead ore has been produced at the Dall mine since April last and many carloads have been shipped up to the present.

The concentrating mills of the Board of Trade and Jarrett mines are nearing completion. These two mines will prove a valuable addition to the producing mines of the Cuba City camps.

#### Benton.

Two carloads of concentrates assaying 47 to 49% zinc is being produced at the

Frontico mine weekly, as well as one car of low-grade zinc ore and about 5,000 lbs. of lead ore.

The production of the Wilkinson mine is still from one to two carloads of lead ore per week. A large body of lead ore exists in this mine in disseminated formation.

The Wiseman, which joins the Wilkinson on the north, also has heavy bodies of both lead and zinc ores.

The Fox mine at Buncomb has become one of the heavy producers of zinc concentrates in the district. About 30,000 lbs. also of lead ore is being shipped each month and a larger body of this ore has been opened up, which will increase its output.

The Coon Branch Mining Co., which owns the Goose Hope mine, is about to resume operations. This mine is on a continuation of the ore body of the Fox, to the north, and is opening up well.

The Little Bennie, owned principally by Dubuque and Benton people, seems to have a continuation of the ore body from the Fox mine on the south. Crosscutting is disclosing a very rich body of zinc ore.

Operations have recently been resumed at the Pittsburg-Benton mine at Lead mine, large quantities of both lead and zinc concentrates are being turned out. Two shafts were sunk during the past winter and spring and good bodies of ore were uncovered.

The Etta mine, which joins the Pittsburg-Benton to the east, is also a heavy producer of both lead and zinc. This mine has been worked for many years and its body of ore seems to be inexhaustible.

The Lucky Twelve management at New Diggings is developing a very heavy sheet ore body. The sheets discovered thus far range from 2 to 6 ins. in thickness. The ore is rosin jack.

About 30 tons of zinc concentrates is being produced daily at the Mills mine at Hazel Green, as well as from 2,000 to 3,000 lbs. of lead.

#### Platteville.

The "dry separating plant" is being enlarged for heavier output. A car of zinc concentrates from the Royal Princess mine, south of Galena, Ill., is being treated at the Enterprise calciner. Several cars of concentrates from the Fox mine will also receive treatment at the same calciner.

#### Dubuque, Iowa.

Since the completion a few months ago of the mill at the Avenue Top mine, there has been produced and disposed of about \$20,000 worth of zinc concentrates, and there is now ready nearly 5,000 tons, which will be marketed when the price of zinc becomes favorable. A large body of lead ore has just been exposed in crosscutting from the shaft on the March range and from 3,000 to 1,000 lbs. of lead is the record daily.

Development work on the Goose Horn mine is disclosing large bodies of lead and zinc ores.

The Dubuque & Lake Superior Mining Co., owners of the Pike's Peak mines on

the outskirts of the city, recently held its annual meeting at Superior, Wis., and it was voted to at once begin the construction of a 100-ton concentrating mill.

#### Galena, Ill.

At the Royal Princess mine, south of Galena a carload of zinc concentrates is being produced daily. The property contains a very large deposit of ore.

Work will be resumed at the Marsden Black Jack mine, recently purchased by the Cons. Zinc Co.

## CANADA.

### ONTARIO.

#### Colalt.

Shipments from the camp for the week ending June 27 were 410 tons, making a total for the year to that date of 8,992 tons. The shipments were as follows:

	Week June 27.	Year 1908. Lbs.
Buffalo .....	42,680	694,100
City of Cobalt .....	116,400	562,380
Colalt Central (Standard) .....		196,250
Colalt Lake .....		217,210
Cobalt Townsite .....		82,720
Coniagau .....	62,210	627,790
Crown Reserve .....		97,681
Drummond .....	40,150	198,790
Forster .....		178,480
Kerr Lake .....		351,570
King Edward (Watts) .....	60,160	428,850
La Rose .....		2,225,400
Little Nipissing (Peter-son Lake) .....		40,110
McKinley Park .....	58,120	1,621,220
Nancy Helen .....		129,040
Nipissing .....	62,100	2,121,690
Nova Scotia .....		60,190
O'Brien .....	63,320	3,068,200
Provincial .....		151,680
Rebel of Way .....	66,480	360,480
Silver Cliff .....		52,000
Silver Leaf .....		197,200
Silver Queen .....		60,190
Temiskaming .....	120,000	428,040
T. & H. B. .....		515,250
Trethewey .....	133,500	1,291,670

The bush fire in southeast Coleman, which destroyed the buildings and plants at a number of mines is now under control and no further damage is feared. The total loss will not exceed \$30,000. The extensive plants of the Badger, Beaver and Rochester were saved only by the efforts of the employees and volunteers.

The court of appeal for Ontario has dismissed with costs all three appeals from the judgment of Chief Justice Meredith in the case of Crawford vs. The Lawson Mine, Ltd., and McLeod vs. Crawford.

The fire which destroyed the camps and buildings on the Cochrane property will delay the starting of operations, but arrangements are being made to rush the construction of new buildings. A 3-drill compressor, boiler and hoist will be installed.

Six cars of ore were shipped from the Trethewey mine in June to the Canadian Copper Co. at Copper Cliff. The surface work this spring has uncovered a number of new leads carrying good values. The No. 1 shaft is down 100 ft. and drifting is being done at two levels. No. 2 shaft is down 185 ft.

A car of high-grade ore was shipped from the Coniagau to the smelter at Trail on June 26. The underground development totals nearly one mile. Seven drills are now being operated in the

drifts from the No. 2 shaft, which is down 170 ft. The total shipments so far this year of high-grade ore and concentrates is 653 tons. This is twice as much as was shipped during the same period of 1907.

Twenty men were to start work July 7 on the Strathcona Colalt property in Buck township. Two drills will be operated.

A new 3-compartment shaft will be sunk on the Temiskaming to a depth of 250 ft. and connections made from this shaft with all the workings. The mine is in splendid shape and shipments are being made.

Plans are being prepared for a new concentrator at the O'Brien mine that will have a capacity of 100 tons per day.

### BRITISH COLUMBIA.

#### Phoenix.

The shipments from this district for the week ending June 27 and for the year to that date were:

	Week. Tons.	Year. Tons.
Granby .....	22,911	522,823
Mother Lode .....	8,230	317,330
Oro Denoro .....	2,070	12,476
Sally .....	80	80
Crescent .....	50	50
Snowshoe .....		367

The receipts of ore at the various smelters of this district for the week and for the year to date read:

	Week. Tons.	Year. Tons.
Granby, Grand Forks .....	20,952	500,812
British Columbia Copper .....		
Cdo., Greenwood .....	12,774	36,750
Cdo., Trail .....	2,749	128,261
Le Roi, Northport .....	2,926	79,816
Sullivan, Marysville .....		5,724

Work has been going on steadily at the Dominion Copper Co.'s Brooklyn and Rawhide mines for a week or more, and while the working force is not complete, it will be gradually increased as conditions warrant. The mines are now about ready for the resumption of shipping and will appear on the shipping list next week. The large electric-fueled furnace at the smelter has been blown in. It has a capacity of 650 tons per day. The two smaller furnaces, with a combined capacity of 600 tons per day, will be blown in as soon as there is ore enough on hand to keep them running.

The usual operations have been gone ahead with at the Granby and British Columbia Copper Co.'s properties.

Mining is active around Grand Forks district and considerable work is being done on the smaller properties thereabouts in anticipation of better railway facilities through there in the near future. From the bottom of a 20-ft. shaft on the C. P. R. claim in Franklin camp last week ore was taken that assayed \$80 in gold; \$15 copper and a trace of silver.

#### Nelson.

The favorable outlook for mining in this district is giving courage to the owners of small properties and a greater amount of systematic development work is being done hereabouts this year than for some years past.

Messrs. Robbins and Bailey of Ritzville, Wash., who are heavily interested in the Foghorn, near Ymir, visited that property during the week and a contract

was let for the driving of 100 ft. of tunnel on the property and work will be started immediately.

A ledge has been located within four miles of Nelson containing ruby and native silver, which goes to show that even camps of many years standing are not always thoroughly prospected.

Ore is being found on the Mayflower and Hilltop, on Sheep creek, carrying 16 ozs. gold, 64 ozs. silver and 7½ copper.

#### Rossland.

Shipments from the camp for the week ending June 27 and for the year to that date were:

	Week Tons.	Year. Tons.
Centre Star .....	2,558	86,841
Le Roi .....	1,470	41,409
Le Roi 2, Ltd. .....	285	12,969
Mayflower .....		35
Giant-California .....		95
Blue Bird .....		110
Rod Eagle .....		20
Evening Star .....		488

Rich ore has been found at Frontier about nine miles south of Rossland. An assay taken showed \$50 in silver and \$10 in gold. Four men are now doing development work on the ledge.

The lessees of the Mayflower have another car of rich ore about ready for shipment to Trail. The extraction of valuable ore continues on the Blue Bird.

## MEXICO.

#### Cananea.

Official announcement has been made by the management of the Cananea Cons. Copper Co. that two furnaces were to be blown in this week. About 800 tons of ore from the Elisa, Puerto Blanco and Cananea-Duluth mines, which does not require concentrating, will be treated daily. It is not expected that the concentrator will start up for some time yet. The great number of improvements made during the shut down are calculated to cut the cost of copper down below 12 cts. per pound, including transportation and handling expenses to New York.

The Cananea-Bisbee Co. has just put on a force of men. This company has ample capital on hand to carry on work for a considerable length of time and this will be replenished regularly by ore shipments which it is intended to begin in a few days. P. J. Tehaney of Cananea, and M. J. Cunningham of Bisbee are directing operations.

The San Jose Mining Co., which was recently reorganized in order to straighten out some legal difficulties, has been put upon a solid basis and incorporated under the laws of Arizona as the Bisbee-Sonora Mining Co. Work has commenced at the property and the mill, which has been completed over two years, will be running in a short time. E. C. Sparrow is president and M. J. Thomas of Douglas, Ariz., is general manager.

A good copper strike has recently been made on the 700 level of the Cohe Grande mine, about three miles from Noria, this state. A tunnel has been nearly completed to this level and some valuable ore has been encountered. It is the intention of the Sonora Copper Co., which controls this mine, to erect a suitable reduction plant on the premises.

Following a late trip of President

Henderson of the Grand Central mines, in the Altar district, comes advice that development and prospect work will commence immediately. This mine is located but a short distance from the Cerro Colorado and El Tiro mines, and looks like a successful venture.

The Wayland mine, a new proposition being worked near the El Tigre mine, shows good results from several prospect holes on the property. Much of the land about it has been denounced on the strength of samples taken out by the owners.

The concessions granted the Cananea Cons. Copper Co. by the federal government have been extended to the Democratic Mining Co. as well. It is more than probable that they, too, will substitute oil for coal and lower their operating costs accordingly. They do not expect to remain idle long after the big company starts up, and it is likely that they will be running by the last of July.

George Mitchell, formerly general manager of the Greene Copper Co., heads a list of Los Angeles people who have purchased the Big Signal mine at Wendendale, Ariz. Arrangements are being perfected for the erection of a smelter at once. They have about a hundred men employed at the mine.

#### Chihuahua.

The two roasters at the new plant of the American Smelting & Refining Co. have been started up on sulphide ores. It has been reported that the plant would be blown in early in July, but a delay probably of at least a month has been necessitated by shortage of water. Although attempts will be made to obtain water from wells in the river below the city, there is doubt if anything can be done until after the rains begin.

The Grenadilla Mining Co. is building an aerial tramway for the more economical transportation of its ores from its mines in the Santa Barbara section of the Parral district to its mill. The company is controlled mainly by Chicago people.

The long drought in the Sierra Madres has lowered the water in the streams to such an extent that mining operations are seriously interfered with. The Septentrión river as well as other large streams are practically dry. The mines of the Rio Plata Mining Co. are reported to be running by steam instead of water, but at only half the normal capacity. The rainy season is now about due, after which there should be no further trouble.

A new strike is reported on the Santa Barbara mine of the Rio Plata Mining Co., near Guazapares, of a 5-ft. vein of silver ore said to run 212 ozs. in silver. This strike was made at a depth of 35 ft. in a winze.

The Qualey brothers, who have an option on the gold-silver property of Governor Creel at Yaquiro in the Rayón district, recently sold to the Torreon smelter a shipment of 29 tons of ore that brought \$17,000. The ore ran 600 ozs. in silver, the remaining values being gold.

#### Oaxaca.

The shaft of the Oaxaqueña mine, in the San Jose district, is getting in better

ore each week. The ore now being taken from the shaft runs nearly 200 pesos to the ton. Considerable attention is being attracted to the San Jose district by the find.

The Mascota mine, in the district of Tehuantepec, is reported to be in excellent ore. Engineers left the city last week to make complete surveys of both the surface and the underground workings.

The La Union mine, in Taviche, which has been closed for some time, has been reopened. Geo. Hughes, an official of the company, has spent some time in the camp planning the future work.

The machinery for the El Guebesh mill, which recently arrived from Denver, is being transported to the property and its erection will shortly be begun.

Despite the bad roads due to the heavy rains of this season of the year, the machinery for the new Carmen mill, being erected by Geo. R. Comings, in the Sierra Juárez, has not been delayed. The work of installing the machinery is progressing rapidly, and the mill will soon be ready for the first run.

The plant of the Oaxaca Smelting & Refining Co. is to be sold at auction in the near future. The mortgage has been foreclosed and the judge of the first civil court has ordered the sale. There is some speculation as to who will purchase the property. H. M. Holbrook, who represents the bond holders in the old company, was expected to be the only bidder, but it is rumored that the Tequitlan Copper Co. and the American Smelting & Refining Co. will also be bidders. The news of the early sale of the smelter has been received with great satisfaction by the miners of this state, as it means the solution of the smelting problem. Mr. Holbrook is now on his way to Mexico and it is believed that he will be prepared to make the highest bid on the property.

#### Guadalajara.

George E. Zimmerman, secretary of the Boca Ancha Mining Co., states that the Boca Ancha reduction plant is in successful operation, and that concentrates running over \$500 to the ton are being accumulated. Out of the returns secured from the sale of these concentrates the company expects to pay a dividend on its preferred stock this year. The capital of the Boca Ancha Co. is \$1,000,000, divided into 100,000 shares of preferred and 1,000,000 shares of common stock. Considerable development work is now in progress on the Boca Ancha mine, and ore running over 1,000 grains silver to the ton has been opened up in the new workings. The company's plans for the immediate future include a cyanide annex to handle the dump ore at the mine, and the installation of a hydro-electric plant to furnish power for mining and milling operations. The officers of the company are: Charles E. Lee of Chicago, president and treasurer; George E. Zimmerman of Rochester, N. Y., secretary, and C. C. Bruckner, vice-president and general manager.

Obadiah Sands of Chicago has purchased the Providencia mines in the Guanajuato district of Guanajuato from

the Guanajuato Mining Co., of which F. J. Hobson is president. Mr. Sands will at once organize a company with a capital of \$1,000,000, to be known as the Guanajuato-Providencia Mining & Development Co., to take over and work the properties. The Providencia mines are only 500 meters distant from the famous Pinguico mine, at present the foremost producer in Guanajuato.

H. N. Canoll, formerly of Helena, Mont., who recently bought the old Garrochas copper mine, 24 miles southwest of Ameca, this state, has ordered a boiler and hoist for the property for use in sinking a 300-ft. shaft. The shaft has already reached a depth of 90 ft. The new development will be pushed.

#### Mexico City.

The Negociación Minera de San Rafael y Anexas de Pachuca has recently placed with G. & O. Braniff & Co. of this city, one of the largest orders for electrical apparatus that has been placed in the republic for many months, all of which is to be manufactured by the Westinghouse Electric & Manufacturing Co. of East Pittsburgh, Pa. The apparatus comprises, approximately, 40 motors, a large number of transformers, motor panels, high-tension and low-tension switchboards, circuit breakers, pumps, etc. The electrical apparatus will total about 2,000 h. p. and will be used in connection with a new 60-stamp mill and cyanide plant and part will apply to service in the mines. For driving the stamps 75 h. p. motors will be used, and for the tube mills 100 h. p. motors.

In connection with the cyaniding plant Butters pumps will be used for slime circulation, Morris and Aldrich for handling the solutions, Frenier for the sands, Goulds vacuum pumps, and others, all of which are to be electrically driven by individual motors, either direct connected or belted. The cyaniding equipment is sufficient for handling the output of a 100-stamp mill, so that the mill can later be increased to 100 stamps very readily with little additional expense.

The first of the Westinghouse electrical apparatus is to be shipped the latter part of this month, the remaining equipment following at shorter intervals. When completed this property will, without doubt, be one of the most modern equipped and economically operated of any electrical mining installation in Mexico.

Manager Narvarz of the La Union mine at Pachuca, state of Hidalgo, has placed an order with the Moore Filter Co. of New York city for a type A Moore slime plant having a capacity of 150 tons of dry slime daily.

The Benito Juárez Mines Co. of Salinas, San Luis Potosí, with mines at Penon Blanco, has its 150-ton mill and cyanide plant nearly ready for operation. The equipment of machinery was furnished by the Allis Chalmers Co. of Milwaukee, Wis. The mill and several mines of the company at Penon Blanco will be operated electrically. The Benito Co. has suspended shipments to the Aguascalientes smelter and is storing its ore pending the completion of the plant.

# Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

Recent auction sales in New York have been three shares National Fuel Gas Co. at \$113 per share; two preferred shares, Georgia Marble Co., at \$15 for lot; four shares Pennsylvania Allen Portland Cement Co., at \$10 for lot; 200 common and 50 preferred shares National Salt Co. at \$26 for lot; and 100 common shares C. K. Davis Coal Co. at \$100 for lot.

The North Butte Extension Mining Co., which has suffered severely from the lack of funds, owing approximately \$60,000 on July 1, is being refinanced. The directors on June 27 decided to offer for immediate sale \$75,000 in notes of the company in denominations of \$500, \$1,000 and \$3,000 payable on or before six, nine or 12 months from date, the proceeds to be used in liquidating the indebtedness. It is said that enough of the notes have already been discounted to take care of immediate requirements, thus avoiding delay in operating the property and additional expense incidental to litigation which probably would have otherwise followed. The prospects are that the company will issue bonds later to the amount of \$250,000 or \$300,000 for the purpose of taking up the new notes and to furnish funds for further developing the property. A. M. Andrews of the firm of Dudley A. Tyng & Co., stock brokers of Chicago, has been elected treasurer and a director.

The American-Mexican Mining and Development Co., incorporated in South Dakota in 1903 with a capital stock of \$1,000,000, and claiming to have options on properties in Torreon and Vallardena, Mexico, is in trouble. Alleged fraudulent use of the mails in floating the stock and other dishonest methods recently resulted in the federal grand jury indicting the organizers of the company, namely, Dr. W. S. Phillips, a dentist; Dr. A. T. Grove, dentist; Walter S. Dillon, lawyer; W. T. Arms, former salesman; Marc Sherwood, former salesman; J. B. Swalley, merchant; H. E. Graham, stock jobber and general promoter; and W. K. Graham, broker and partner of H. E. Graham. It is claimed that thousands of people invested in the concern, and it is believed that about \$1,500,000 worth of stock was unloaded on the public. The accusation is made that the monthly dividends, which were paid from April, 1903, to January, 1906, aggregating \$357,318, came from money obtained from new subscribers to the stock.

total, \$4,784,298. Liabilities—Capital stock, \$780,000; accounts payable, \$1,365,884; surplus, profit and loss, \$2,638,414; total, \$4,784,298.

## NEW IOWA QUICKSILVER CO., CAL.

The report for the year ending Dec. 31, 1907, is as follows: Production, 7,675 flasks of 75 lbs.; sales, 175,073 flasks; net earnings, \$89,650; dividends, \$80,000.

## ALASKA UNITED GOLD MINING CO.

The receipts for the year ending Dec. 31, 1907, were: Bullion, \$219,654; base bars, \$5,096; sulphurets, \$136,201; interest, \$800; rental and profit from 700-ft. claim, \$59,246; total, \$420,497. Disbursements were: Mining and development, \$213,235; mining, 700-ft. claim, \$53,538; milling, \$76,198; sulphurets expense, \$22,703; general expense, \$5,894; construction and repairs, \$2,661; miscellaneous, \$9,389; total, \$405,628. Then the net operating profit was \$11,869, equivalent to 6.97 cents per ton of ore milled.

At the Ready Bullion there were mined, hoisted, crushed and placed in the mill bins, 213,370 short tons of ore. The total quantity of rock broken was 224,866 tons. The 213,370 tons crushed in the 120-stamp mill cost an average of 35.71 cents per ton; while the yield was \$1.0889. The average duty per stamp was 3.75 tons per 24 hours. The quicksilver consumption was 37,995 ozs., of which the batteries took 27,754 ozs.; plates, 1,984 ozs.; vanners, 840 ozs.; miscellaneous, 7,298 ozs. The quantity of quicksilver fed per ton of ore was as follows: Batteries, 1.3101 oz.; plates, 0.0093 oz.; vanners, 0.004 oz.; cleaning amalgam, 0.0346 oz.; total, 0.178 oz. The gross value of the ore milled was \$1,8352 per ton, and of the tailings, 18.75 cents. The extraction was 80.78%.

The ore reserves at the Ready Bullion mine are estimated at 1,378,651 short tons, of which includes pillars between the 900-level but not the ore in the shaft and sea pillars above the 900-level. The average assay of 1,820 samples showed \$214 per ton, the extreme values being 64 cents and \$3.73. The higher figure represents the average assay of 108 samples from the 1,500 level.

In the 700-ft. mine there is estimated to be 355,082 tons of ore in reserve below the 550 level. During the past year 57,276 tons, averaging \$2.48 per ton, were shipped to the mill.

## MONTANA MINING CO., LIMITED.

This company owns property at Marysville, Mont., and in Elko county, Nevada. According to the past year's report, expenses all round have been reduced to their lowest figure. A profit of \$2,400 (\$12,000) was made after charging all expenses. This profit has been carried forward to next year's account. The expenditure on capital account has been en-

tirely confined to Edgemont, where some \$3,347 (\$16,735) have been spent in driving the tunnel and in the purchase of machinery connected with it. There has been realized by the sale of old machinery at Marysville about \$1,985 (\$9,925).

After paying legal expenses in the compromise ground suit, there remains \$3,490 (\$17,405) to be carried forward.

The output of the Edgemont property for the year was 22,110 tons, yielding \$141,892 or \$6.41. In 1906 the production was 21,690 tons, valued at \$137,633 or \$6.35 per ton. Expenses of treatment in 1907 averaged \$4.98 per ton, as against \$4.47 in 1906, leaving a profit of \$31,612 for the year. Of this sum there has been spent for prospecting and developing the mine some \$20,908. The company is carrying its own fire insurance and is providing a reserve fund of \$210 (\$1,050) a year against fire on the Edgemont property. The tunnel on this property is being driven to intersect the Lucky Girl and the Lucky Boy veins. Fortunately the tunnel drains the mine and all the upper levels, and the water thus disposes of itself without expense. The tunnel is now 1,845 ft. in, and at a distance of 4,000 ft. it is hoped to intersect the veins. In the course of tunneling there were met three unknown veins which it will pay to investigate. The Edgemont property is paying its way; it is not depreciating in value as work proceeds.

With regard to the litigation in Montana, it will be remembered that the Supreme court gave the company absolute title to the compromise ground, and, as a matter of form, remitted the action for a new trial. The St. Louis Co. made two or three attempts in the local courts to prevent the company proceeding to work the compromise ground. These were ineffectual, and the Montana Co. was beginning to extract the ore contained in that ground when suddenly, on November 8 last, the St. Louis Co. made a fresh move in the old suit. Instead of setting it down for a new trial, upon which it was hoped to fail, the St. Louis Co. took proceedings to amend its pleadings by adding a fresh claim against this company. The St. Louis Co. admitted in the pleadings the Montana Co.'s absolute right to the compromise ground, but contended that the compromise ground was contained within certain limits, that outside those limits the Montana Co. had, about June, 1893, been mining on ground known as the Nine Hour lode mining claim, belonging to the Montana Co., but over which the St. Louis Co. claims apex rights, and that the St. Louis Co. had extracted from that ground ore to the amount of \$1,000,000. The St. Louis Co. asked for, and obtained, a fresh injunction restraining the Montana Co. from working the compromise ground on the ground that the removal of the ore would block and shut off the workings to the disputed vein, and also on the further ground that, if the Montana Co. were allowed to dispose of the ore in the compromise ground, the St. Louis Co. would be deprived of the fruits of its judgment if it succeeds. This fresh injunction again paralyzes the Montana Co., which must again await the final decision of the Supreme court.

## Official Reports.

### TAMARACK MINING CO., MICH.

The financial condition of the company on Feb. 29, 1908, was reported to the Massachusetts secretary of state as follows: Assets—Real estate and machinery, \$2,766,740; merchandise, \$718,719; cash and debts receivable, \$1,298,320;







### Latest Quotations on American and Foreign Mining Stocks.

**Copper, Gold, Silver, Lead, Zinc, Quicksilver.**

(\*) Dividend Papers. (†) Levy Assessments

[illegible][illegible]

**Mexico.**

[illegible]

**San Francisco.**

Name of Company.	Par Value.	High.	Low.
Alpha	\$1	\$6.96	\$6.00
Algon	1	1.00	1.00
Amber	1	1.10	1.00
Amesbury	1	1.00	1.00
Bent & Beecher	1	1.00	1.00
Boston	1	1.00	1.00
Caladonia	1	1.10	1.00
California Coma	1	1.00	1.00
Chandler	1	1.00	1.00
Chesapeake	1	1.00	1.00
Com Imperial	1	1.00	1.00
Con Virginia	1	1.00	1.00
Edgewood	1	1.00	1.00
Empire Fuel	1	1.00	1.00
Grand Ferry	1	1.00	1.00
Hall & Noremum	1	1.00	1.00
John	1	1.00	1.00
Justice	1	1.00	1.00
Kentonia	1	1.00	1.00
Lady Washington	1	1.11	1.00
Northfield & Curry	1	1.00	1.00
New York Coma	1	1.00	1.00
Nonidental	1	1.00	1.00
North	1	1.10	1.00
Norman	1	1.00	1.00
Proctor	1	1.00	1.00
Richmond Burke	1	1.00	1.00
Rock	1	1.00	1.00
Seaboard	1	1.00	1.00
Shelton	1	1.00	1.00
Shelton, Baicher & Mims	1	1.00	1.00
Silver Hill	1	1.00	1.00
Stevens, Kervin & Co	1	1.00	1.00
St. Louis	1	1.00	1.00
Union Coma	1	1.00	1.00
Utah	1	1.00	1.00
Vander	1	1.00	1.00

**Toronto.**

Name of Company.	Par Value	High.	Low.
Buffalo.....	\$1	\$2.00	\$1.00
Cobalt Lake.....	1	3.00	.75
Green-Nobell.....	1	3.50	.50
Frontier-Cobalt.....	1	.65	.45%
Green-Nobell.....	1	.17	.10
Kerr Lake.....	1	3.00	1.50
La Hone.....	5	9.75	5.12
New Temiskaming.....	1	.40	.20
Nova Scotia.....	1	.25	.15
Peterson Lake.....	1	1.55%	1.14%
Red Rock.....	1	.18	.10
Silver Lake.....	1	.24	.13
Truthway.....	1	.80	.70
Wells.....	1	.40	.30

### Dividends Declared.

[illegible]

**London** (NY CARL

Name of Company.	High.	Low.
Alaska Treadwell.....	\$95	\$95.00
Camp Bird, Colo.....	5	8.80 1/2
Clarks, Mex.....	8	7.50
El Oro, Mex.....	5	7.00
Esperanza, Mex.....	8	8.10 1/2
Frederick, Cal.....	9	9.25
Hamby, Colo., (Ex-div.).....	5	7.50
.....	.....	.....
.....	.....	.....
.....	.....	.....

#### Dividends of Foreign Gold, Silver, Lead and Copper Companies.

[illegible]

### Assessments Levied

[illegible]

corrected to July 5, 1964



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\* Illustrated.

## World's Steel Combine,

One of the peculiar features of the reported international steel combination is that the United States will join hands with Germany, Belgium and Russia to wage a trade war against Great Britain.

Of late, there have been various rumors circulated in the domestic and foreign press that the steel industry of the world would eventually be concentrated to rid it of the competition which has become very keen, especially with the expansion of American exports.

Last year the total value of the United States exports of iron and steel products, not including machinery, builders' hardware and the like, amounted to no less than \$45,000,000. If we add the exports of machinery, etc., we have a grand total for the year of \$197,036,781, which is the high record. Great as this amount may seem it is less than one-half the exports reported by Great Britain.

Two factors which will aid the United States, for instance, in winning over some of the markets now supplied with British iron and steel, are cheap and increased domestic production of ore and fuel.

The United States mines annually about five times as much iron ore as does Great Britain, a country by the way, that imports from Spain and elsewhere a quantity equivalent to about two-thirds its own output of iron ore.

In coal mining the United States beats all other countries, a supremacy which it has held over Great Britain for nearly 10 years. Today the United States produces nearly twice as much coal as Great Britain. It is also worthy of remark, as an important economic factor, that Great Britain exports fully one-quarter of all the coal it mines, whereas the foreign shipments of the United States amount to a very small fraction of the domestic production.

Judging by the fragmentary reports that endeavor to connect the links of the supposed international steel combination (rather a trade agreement similar to the late steel rail pool) it seems as if the gavel at future conference will be held by the representative of the United States Steel Corporation. It is too early to predict the result of the proposed trade war against Great Britain, but some people believe that eventually the fight will be entirely with Uncle Sam, who can supply the material at a comparatively lower cost. The smaller steel producing countries cannot possibly stay in the battle, even if they do make up the rear guard. It should also be remembered that the bulk of the world's foreign

trade is carried in British bottoms. This fact is of peculiar benefit to the British steel industry.

## Government Inspection of Mineral Lands.

What promises to be one of the most important actions of Secretary of the Interior Garfield, as affecting the mineral interests of the west, is the decision he gave in the latter part of May regarding the inspection of mineral lands by government agents.

The credit for this action is given to Lewis E. Aubury, state mineralogist of California, as it was at his suggestion that the conference was called by Secretary Garfield of the following officials: Chief Forester Gifford Pinchot, Commissioner of the General Land Offices Fred Denutt, Director Smith of the United States Geological Survey, Director Newell of the Reclamation Service, and Mr. Aubury.

The first matter considered was the patenting of mineral claims in forest reserves. Mr. Aubury stated that cases had been brought to his attention where patents had been applied for mineral lands in the reserves, and that the owners of the claims had asserted that forest assistants who were not qualified to pass upon the mineral character of the lands had turned the applications down. Mr. Aubury called to the attention of the Forest Service the stupendous attempts at fraud to secure by placer mineral location large tracts of timber land in the Plumas (California) forest reserves.

When the matter of reports of examinations made by special agents of the General Land Office on mineral lands was taken up, Mr. Aubury said: "Give us practical men to report upon conditions, and appoint them from the state or territory where examinations are to be made, and I believe we will have no further trouble. Western men for western positions I believe will solve the problem."

In the complaints made to the California State Mineralogist by many miners it has been asserted that government agents had refused to consider as mineral ground any which did not show pay ore practically from the commencement of development. Such an unjust decision against the miner is apparent to anyone having mining experience, for in probably 90% of the mines which have been opened in the west, thousands of dollars have been expended in development before ore in paying quantities has been discovered.

"Were such a decision to be upheld," said Mr. Aubury, "we might as well quit

mining. In many districts, and particularly in the state of Nevada, are lodges of ore far below the surface, and which show no sign of mineral on top. It is necessary for the miner to sink expensive shafts and crosscut before these ore bodies can be uncovered. But Nevada is extremely fortunate in that there are no valuable growths of timber upon the surface; neither are there small portions of the ground upon which a few vegetables might be grown, thus giving an opportunity to file scrip, timber, homestead or agricultural entry upon the miners' ground. In California, conditions are different; likewise, in a few other western states, but while the government applies one rule to Nevada, Arizona or Utah, this ruling is not observed in other western states.

Mr. Ambury also called the attention of Commissioner Dennett to the action of homestead entries on mineral ground—particularly to those entries which had been made upon the ancient river channels of California, and which had furnished the chief source of the placer gold that has added so many millions of dollars to the wealth of the nation. Special agents had reported favorably on homestead entries against the miner, notwithstanding the decision of Secretary Garfield made in May, 1907, in favor of the miner.

The course of these channels is plainly marked. Their surfaces are covered with lava and entirely unfit for cultivation or grazing in most instances. They carry large volumes of water, and it is necessary for the miner to run long and expensive bed-rock tunnels to tap the gold bearing gravel, yet homestead and other entries have been filed upon and over the miners' claims, and while they were prosecuting work upon their tunnels endeavoring to reach the gravel. Until such tunnels had pierced the gravel they could not prove to the satisfaction of the special agents that the land was mineralized, and notwithstanding the good faith shown by the miners, decisions have been made against them.

Mr. Ambury cites one case where upwards of \$50,000 had been expended by the miner in running a long bed-rock tunnel, and he was prosecuting work upon it when a timber and stone entry was filed over the miner's claims. Thanks to Secretary Garfield, his decision reversed that of the commissioner of the General Land Office, who had decided in favor of the timber and stone entry.

Hundreds of cases of discrimination against the miner can be found in our western states or territories, and this

has been brought about by the misrepresentation of the laws by special agents.

### Sensational Discoveries.

Whenever a supposed authority makes a "discovery," whether it be reported from the remote parts of Mexico, the Fiji islands, or even the western states of our own country, the "popular science" journalist, in words extraordinary, begins to build fortunes on paper like the castle in the air of the political "advance agent of progress."

Not satisfied with varnishing the first meager reports, which as experience has proved are invariably too enthusiastic to be true, the pseudo-scientist and "penny-a-liner" journalist stretches his imagination until the threads of truth are so closely interwoven with the cords of falsehood that it sometimes requires the skill of a reader of more than ordinary intelligence to separate the wheat from the chaff.

This partly explains why the widely circulated report that hismith ores have been found in Guauajuato, Mexico, has been declared to be untrue by the American consul who has made a careful investigation. Perhaps the recent "discovery" of uranium ore in Guerrero may also be false.

In our early days of journalism we remember having read of the worm whose habitat was in a steel rail and whose insatiable appetite resulted in wrecking a train. This fable was widely read, being copied by both American and European papers, and if we mistake not at least one scientific society gave the matter serious thought. The "discovery" originated in the fertile brain of an American editor, who some years after the mysterious worm had "died" by journalistic consent, was amused to see an account of its "resurrection" in a contemporary. The "popular scientist" must needs make a living, and so long as the public want to be entertained by reading remarkable stories he shall keep busy.

An accident has resulted in igniting a large lake of oil in the state of Vera Cruz. According to report the fire has been burning for some days, and the probability is that the Pennsylvania Oil Co., composed of Pittsburgh men, which has been developing the field, will suffer a heavy monetary loss. The oil field is about 75 miles southeast of Tampico, near the San Geronimo river. This is another regrettable accident which must be added to the classification, "due to the carelessness of a workman." Mexico's petroleum industry has in recent years

made good progress, but the supply is not sufficient, hence imports are made. Last year the imports from the United States included 22,369,287 gals. of crude oil, valued at \$1,121,546, and 859,759 gals. of lubricating and paraffin oil, valued at \$172,866. The imports of crude oil show a marked increase over previous years, for the reason that an appreciable quantity is used for fuel.

Advice to the graduates of schools of mines, when given by a veteran mining man—a veteran not in years but in experience—should always be welcome. So, we repeat the words of wisdom of Mr. Thomas F. Walsh at the commencement of the Colorado School of Mines recently: "Don't speculate in the stocks of any mine you manage, nor accept any commission in any mine sold to a constituent without his full knowledge and approval." Many are the successful men who have given like advice to the graduating engineer, and we are glad to testify that each succeeding generation is reaping the benefits of its predecessor. By industry, honesty and conservatism we may hope to overcome the problems which the complexity of Nature has made so difficult, and as the years glide on both reputation and fortune must be the reward of our labors.

The exports of gold from British Guiana from Jan. 1 to May 13 amounted to 17,267 fine ozs., valued at \$356,912, which compares with 18,385 ozs., \$384,160, for the same period last year. There was a time when gold mining in this section of South America attracted wide attention, and many new companies were formed to develop the deposits. In recent years, however, the situation has changed, and there appears to be a better understanding that conservatism rather than speedy judgment in carrying on gold mining operations is the keynote of success.

Cable advices report that the gold production of the Transvaal for June, amounting to 574,973 fine ozs., valued at \$11,884,692, was somewhat smaller than for May and March, though larger than the other months of this year. Excepting the output for May, 1908, and December, 1907, the gold mined in June, 1908, was the largest in the history of the industry. The total production for the first half of the current year was 3,466,957 ozs., valued at \$70,483,811. Compared with the corresponding period of 1907 there is shown an increase of 271,225 ozs., or \$5,696,201, equivalent to nearly 9%.

# Employing Electric Power in Joplin District-I.

By DOSS BRITTAIN.

The dam of the Spring River Power Co., which supplies the Joplin district with electricity, constructed entirely of concrete, is 500 ft. long. At the north end of the dam a core wall and embankment extend in a northwesterly direction for nearly 800 ft., when it encounters the Lowell-Varek road which has been graded and elevated for  $\frac{3}{4}$  mile beyond the end of the core wall and embankment.

Within the dam proper and constituting a part of it is the power house, consisting of a generator room, 30 ft. wide and 45 ft. long, and two turbine rooms, each 90 ft. long, the two flanking the generator room.

At the north end of the central section of the dam are located controlling gates occupying 95 ft. of it. Here are five Taintor gates provided with aprons on the downstream side, which afford an ample spillway for all water passing through the gates. Half a mile above the dam, at a point on the Lowell-Varek road,

*Construction and equipment of buildings of Spring River Power Co. Electricity used for lighting, pumping, hoisting, etc. Choice of motor. Comparative costs of electricity and steam power.*

*General Electric and Westinghouse apparatus. Worthington pumps. Buffalo blower. Sampson hoist. Lombard governor. Taintor gates. Locke insulators.*

tor. making a simple arrangement requiring little care.

The roof of the turbine room is built of heavy boards, connecting the top of the dam, which forms the back of the turbine room, and steel beams connecting the tops of steel columns, which support

below the lower ends of the discharge tubes.

The turbines are designed to make 180 to 200 revolutions per minute and develop with a 24-ft. head, 80% of their theoretical horsepower. With such working head and with seven-eighths of the full gate open, each unit will develop 2,800 h.p., or 5,600 h.p. in all.

The axes of the Taintor gates are made each of two 15-in. 42-lb. I-beams, riveted securely together with necessary accessories for attaching the wooden framing. The radius of the gates is approximately 13½ ft. In case of heavy floods the water is diverted by the sluice gate located above the dam. At ordinary times the controlling gates are sufficient. The Taintor gates are arranged so that the water passes under them.

The electric equipment in the generator room consists of two 1,500-kw. 3-phase, 25-cycle, 2,300-volt, alternating current generators, operating at 187½ revolutions



Partial View of Spring River Dam.

have been installed sluice gates for the diversion of a part of the river's current during high water, when the diverted current passes into Spring river.

The normal elevation of the headwater is 141 ft.; of the tail-race, 113 ft., giving a working head of 28 ft. On the floor of the turbine room, which is at an elevation of 121 ft., the turbines are installed, practically on the bed of the river just above the dam, doing away entirely with a head-race with its obstructed currents. Projecting downward from the floor of the turbine rooms are draft tubes located under the turbines and connect with discharge tunnels built in solid masonry in the lower part of the dam.

Each turbine room contains four pairs of horizontal turbines mounted on a single shaft, which extends through bulkheads into the generator room where direct connection is made with the genera-

tor. This is in front of the turbine room and arranged with slide gates for shutting the water from the turbine wheels when repairs are to be made.

The turbines comprise two units, each consisting of four pairs of modern 42½-in. center discharge horizontal turbines connected in tandem on a horizontal shaft. Each pair is mounted on heavy base plates, mounted on the heavy steel beams forming the turbine room floor. Each two pairs of turbines is provided with one gate shaft, each of which is coupled direct to a Lombard governor.

The water is received in an open flume and discharged through central draft tubes set vertically below each pair of turbines. The flume is protected by racks. The lower end of the discharge tubes is supposed to be at all times from 6 to 12 ins. below the surface of the water. The tail water is usually from 10 to 12 ft. deep

per minute; two 55-kw. 125-volt, direct current exciters, and a switchboard.

The shaft of each generator is coupled directly to the shaft of its respective turbine; the exciters to the turbine shaft by belt. The switchboard 4½ ft. from the wall on the upstream side of the generator room, consists of five panels, two exciter panels on which are mounted the ammeter, exciter, rheostat, and voltmeter switch; two generator panels on which are mounted indicating and recording wattmeters for the 500 kw. alternators, ammeter, and voltmeter; the remote control switch installed for the transformer house for operating the oil switch installed in the transformer house, located on the bank of the river, 50 ft. below the dam. It also contains the set-up transformers and the high tension switches, and the transformers.

Electrical connections between the gen-



erator room and the transformer house are paper-covered, lead-encased cable laid in tile ducts. For each generator a 3-wire 600,000 circular-mill cable is laid in its own tile duct. Other ducts of ample size contain 2-wire cable laid for switch control and instrument leads, also a 125-volt line from the main switchboard buss bars to the main distributing panels in the transformer house, for furnishing light, and power to the small motors.

The transformers are six in number each of a capacity of 500-kw., 2,300 to 3,300-volt, and water cooled. Accessory to these are the necessary high tension buss bars, oil switches, lightning arrestors, current and potential transformers.

The 2,300-volt cables end in ordinary discharge bells on each side of the transformer room and lead directly for the low tension delta connection for the low tension side of the transformer, the high tension delta being above the transformers. The high tension lines pass through Locke wall insulators into another part of the transformer house, finally to oil switches supported on the floor of the second story of the transformer house.

The buss bar compartment, located beneath the switches, is constructed of hollow tile. Single blade disconnecting switches are installed between the high tension buss bars and the switches. All wire connections are made of No. 2 bare wire supported on Locke insulators.

The leads of the outgoing line pass from the high tension buss through the disconnecting switch to the oil switch, along the ceiling to the opposite side of the room, along the wall back of the lightning arresters to the double pole disconnecting switch near the high tension entrance.

The entrance to the transformer house is constructed of slate panels mounted on strap iron supports. The high tension wire passes through the wall into the wiring compartment, through a porcelain insulator to a standard line insulator mounted on a bracket outside of the building. This insulator serves to take up all strain at the end of the line. The coils in connection with the lightning arresters are formed of a spiral 6 ins. in diameter, insulated with  $\frac{3}{4}$ -in. pitch.

A small centrifugal pump connected to a 125-volt, 2-hp. motor, supplies the transformers with water for cooling purposes. After passing through the transformers it passes through a discharge pipe with discharge end submerged below the surface of the tail water, thus forming a simple siphon arrangement which is sufficient to produce current for all ordinary occasions, the centrifugal pump being used only for starting the siphonic action. The transformer house is constructed of hollow tile and is 41 ft. wide by 31 ft. long. The floors are of concrete and steel.

The transmission line consists of three No. 4 bare copper wires on Locke insulators, No. 311, and arranged in the form of a delta. The top insulator is attached by a ridge iron to the top of the pole; the two lower insulators are supported on a 5-cross arm,  $3\frac{3}{4}$  ins. by  $4\frac{1}{4}$  ins. All insulator pins have porcelain bases. The

wires are 44 ins. apart, the lower two being 26 ft. from the ground.

The transmission line is frequently transposed for avoidance of many of the difficulties caused by high tension lines. A partial turn in the line occurs approximately each mile, so that there is a complete revolution between each section of the line, between the power plant and substations, or between substations, these distances ranging from three to five miles.

The ground wire consists of No. 6 soft drawn steel wire placed about 3 ft. below the bottom of the cross arm and about 23 ft. from the ground. It is fastened to the pole by means of a  $\frac{3}{4}$ -in. by 3-in. lag screw and washers. At every fourth pole it is grounded and the connection buried beneath the bottom of the pole, a precaution necessary on account of frequent thunderstorms, especially during the spring and summer, and made in the hope that with its nearness to the transmission line, many of the difficulties of the operation will be lessened.

The telephone line is placed 6 ft. below

of the transmission line beyond any substation from the main power plant may be thrown out of commission, thus allowing all substations between any fault in the line and the power plant to remain in operation while the defect is being remedied.

Between Joplin and Webb City the transmission line is divided into branches, one going to the Prosperity substation and the other to the Oronogo substation. At the junction air-brakes have been installed, making it possible to cut off either branch from the main power plant.

The substations at Galena and Joplin are alike in structure and equipment, both built of brick, 18 ft. square outside, and 30 ft. high. The entrance of the transmission line is in all respects like that of the transformer house, and lightning arresters, designed for 30,000 volts, are connected to the line just inside the substation. Three single pole oil switches designed for hand operation are on the second floor.

The switchboard is on the ground floor of the station in front of the transform-



Prosperity Electric Substation.

the ground wire and transposed every second pole, this being accomplished by using a transposition insulator on every other pole, and an ordinary telephone insulator on the intermediates.

The standard poles are 35 ft. long, with 7-in. top and 6 ft. in the ground.

At the crossing of railroads cradles have been installed below the transmission lines so that any wires, if broken, may be caught and kept from doing damage. The cradles are so grounded that the oil switches are thrown, relieving the broken wires of the current until they are repaired. Like protection is afforded when telephone lines are crossed poles, being set very close on each side of the telephone or telegraph wires, and such device provided as will be a protection against live wires.

Five substations have been installed, one each at Webb City, Prosperity, Oronogo, Galena and Peacock, Kans. At each a special horn switch has been provided so that at each station the portion

of the high tension wires come directly from the oil switches to the delta, then to the transformers, consisting of three 250 kw., 25-cycle, 30,000 to 2,300-volt water cooled transformers. The switchboard consists of three panels, one of 30,000 volts, which controls the incoming line, and two of 2,300 volts, controlling outgoing secondary lines.

From the 2,300-volt transformer secondary leads pass to the low tension delta carried on buss bars mounted on the front of the transformers. From the delta lead covered cable passes under the floor to the buss bars on the switchboard. From the feeder line switches the cable is carried under the floor in conduits, leading then up the wall through insulating tubes to the secondary distributing line. Only one high tension switchboard is provided for disconnecting the substation from the main line. On the switchboard are mounted an ammeter, recording wattmeter, which gives the total output of the station, and a voltmeter.

# The Objects of Alaska-Yukon-Pacific Exposition.

By GEORGE JAMME,

Chairman, Mines & Mining Committee.

*Aims of the undertaking to make known the great natural wealth and methods of recovering it in the territories which gave the exposition birth.*

*Classification of exhibits with regard to equipment and processes of working mines and quarries, preparing products for market, safety appliances, etc. The exposition financed by Seattle.*

*Class 672.—Electric, compressed air, or other motors, for use in opening and operating mines and quarries, and for operating equipment for handling ores and other minerals.*

*Class 673.—Explosives and methods for placing and firing the same, in mines, quarries and deep wells.*

*Class 674.—Equipment and methods for the underground handling and transportation of ore, coal, etc.*

*Class 675.—Machinery and appliances for draining mines and quarries.*

*Class 676.—Equipment for, and methods of, ventilating mines.*

*Class 677.—Equipment for, and methods of, lighting mines; oils, acetylene, electricity; safety lamps, testing for gases, etc.*

*Class 678.—Safety appliances and methods; safety catches, signals, etc. Equipment for treatment of injuries. Mine sanitation.*

*Class 679.—Equipment and methods for handling mining products, and for their above-surface transportation; railways, inclined planes, loose cables, aerial cables, trolleys, etc.; appliances for loading and unloading wagons, boats, cars, etc.*

*Class 680.—Machinery, appliances and methods for working salt mines, petroleum wells, metalliferous sands and gravels.*

*Class 681.—Equipment and methods used in quarrying stone.*

## MINERALS AND STONES, AND THEIR USE.

*Class 682.—Systematic collections in geology, general mineralogy, crystallography and palaeontology. Collections illustrating the structure, modes of occurrence, and origin of ore deposits, and other mineral deposits.*

*Class 683.—Ornamental and building stones, rough hewn, sawed or polished; stones for highway construction and other purposes.*

*Class 684.—Mechanical appliances and processes used in cutting, sawing, shaping and polishing marble, granite, slate and other building stones.*

*Class 685.—Equipment and processes for crushing, separating, washing or dry-*

*ing rocks, clays and other minerals, and mineral fuels.*

*Class 686.—Rocks which produce lime or cement. Processes of utilization with their products.*

*Class 687.—Grindstones, whetstones, pumice stone; other mineral abrasives; processes of their manufacture.*

*Class 688.—Slate; equipment for preparing slate; processes and products.*

*Class 689.—Refractory rocks, fire clays and sands. Molding sands.*

*Class 690.—Clays, kaolin, flint, feldspar and other substances used in the manufacture of earthenware, brick, terra-cotta, glass, etc. Processes of utilization, with specimens of their products.*

*Class 691.—Mica, asbestos, meerschaum, flourspar, graphite (plumbago), gypsum, and other non-metallic minerals, not elsewhere provided for. Processes of utilization with their products.*

*Class 692.—Gems and precious stones; lapidary work.*

*Class 693.—Common salt; nitrate, sulphates, borates, and other natural salts; methods of purification with their products.*

*Class 694.—Mineral waters. Artesian water conditions. Utilization of water.*

*Class 695.—Sulphur and pyrite. Process of utilization, with their products.*

*Class 696.—Natural mineral paints. Processes of preparation, with their products.*

*Class 697.—Natural minerals fertilizers. Processes of preparation, with their products.*

*Class 698.—Asphalt and asphaltic rocks; mineral bitumen and wax; amber, jet, etc. Processes of utilization and their products.*

*Class 699.—Mineral fuels and luminants; peat, lignite, bituminous coal, anthracite; coal dust and compressed coal; petroleum and its products, mineral gases. Equipment and processes for compressing fuels; for preparing coke and by-products; for storing, refining and handling petroleum and its products.*

*Class 700.—Metallic ores of every kind and products. Native metals.*

## MINE MODELS, MAPS, PHOTOGRAPHS.

*Class 701.—Maps, charts, photographs and models illustrating geologic or topographic features, and their relation to mineral deposits, or the structure or mode of occurrence of mineral deposits. Mine models, working plans of mines; maps, photographs, etc., of mining operations, plants, camps, etc.*

## METALLURGY.

*Class 702.—Equipment and processes for the handling and preparation of ores; hand sorting, storing, sampling, crushing and pulverizing, screens and screening, concentrating, elevating, conveying, drying, etc.*

*Class 703.—Equipment in amalgamation and in the use of cyanide, chlorine and*

The object of the exposition is to exhibit the resources of the United States and countries bordering on the Pacific ocean, and, as mineral wealth is one of the chief resources, the mining industry will be made one of the more prominent features.

Our aim, in arranging and carrying out the program, is to bring about something that may be of benefit to mining, either in the methods of mining and treating ores and minerals or in equipment.

So far as preparedness goes, the grounds and buildings are about 65% completed. The Mining building is nearly finished and we are ready to receive exhibits.

The Alaska-Yukon-Pacific Exposition will be held during the summer of 1909, at Seattle, Wash. Seattle, while not considered as a "mining town," has tributary to it a mineral bearing and mineral producing territory of over 1,000,000 sq. miles in extent, the annual output of which approximates \$75,000,000. It is the direct supply station and clearing house for a vast army of industrious mining people.

Inasmuch as Alaska and Yukon, the territories giving name to the exposition, are known principally for their mining industries, it is contemplated, as the high aim of this undertaking, to bring about a larger and, if possible, more useful mining exhibit than has ever before been made at expositions of international character. It is proposed to lay before the world, not only a measure of the great wealth of these empires, but also the difficulties to overcome and the requirements needed in winning it; with the hope that through these efforts, some material benefit may be derived to the mining industry in general.

With that object in view, the program herewith given, has been outlined, and all mines and mining people, and manufacturers of mining machinery, equipment and supplies, are extended a cordial invitation to participate.

## WORKING MINES AND STONE QUARRIES.

The equipment and processes are grouped as below:

*Class 667.—Equipment and methods of geological surveys, and other institutions for the promotion of mining. Instruments and equipment for underground surveying.*

*Class 668.—Equipment and methods for prospecting for mineral veins and deposits; building stones, coal, petroleum natural gas, artesian waters, etc.*

*Class 669.—Equipment and methods for assaying, analyzing or testing ores, rocks and other mineral substances.*

*Class 670.—Equipment and methods for drilling, cutting, or otherwise breaking down rock, ore, or other mineral in quarries, open pits or mines; sinking shafts, opening galleries, drifts or tunnels.*

*Class 671.—Equipment for, and methods of, timbering or otherwise securing mine shafts, drifts, or tunnels.*

other chemical solvents in the treatment of ores.

**Class 704.**—Equipment, methods and products of the manufacture and use of refractory materials for metallurgical purposes (bricks, blocks, crucibles, retorts, etc.).

**Class 705.**—Equipment and processes in smelting ores; furnaces, furnace construction; appliances used in operating furnaces and handling furnace products. Equipment and methods in the generation and use of gases, the preparation and use of liquid and solid fuels, and the use of electricity in metallurgical furnaces; handling and use of slags; recovery and use of dust, fumes, etc.

**Class 706.**—Equipment, materials, processes and products used in the treatment of the ores of iron, manganese, chromium, nickel and other metals used in the manufacture of iron alloys and special steels. Equipment for smelting, blast furnaces and accessories; iron foundries, cupolas, blowers, etc. Production and varieties of pig iron and iron castings, malleable cast iron, ferromanganese and manganese castings, and castings of other iron alloys and the metals used in these alloys.

**Class 707.**—Equipment, methods and products of the manufacture of iron and steel in ingots, billets, bars, sheets or plates, etc., and of the production of steel castings, etc. Puddling, reverberatory and smelting furnaces; hammers, presses, rolls. General arrangements and equipments for producing Bessemer metal, open hearth steel or crucible steel. Various processes of manufacturing iron or steel directly from the ores.

**Class 708.**—Equipment, methods and processes in the manufacture of iron and steel in commercial forms; hoop iron, band iron, rods for wiredrawing, iron and steel wire; iron of special sections, armor plate, sheet iron and sheet steel for commercial, building, metallurgical, and other purposes; rails, axles, tires, wheels, large forgings, gun barrels, projectiles, tubes (welded or seamless), etc. Ordnance equipment other than naval and its production.

**Class 709.**—Equipment, materials and processes used in the metallurgy of copper, and products obtained. Treatment of ores, production of copper and copper alloys, bronze, brass, etc., ingots, bars, sheets, wire and other forms. Electrolytic and other processes used in refining copper, and in separating the accompanying gold, silver, etc.

**Class 710.**—Equipment, materials and processes used in the metallurgy of gold and silver, and products obtained. Treatment of the ores; retorting, refining, stamping, and shipping bullion. Gold and silver in bars and other forms. Equipment, materials and processes used in the metallurgy of lead, and products obtained; treatment of the ores; refining of lead bullion and the separation of the associated gold and silver. Production of lead in commercial forms, pig, bars, sheets, pipes, shot, test lead; lead alloys; white lead.

**Class 711.**—Equipment, materials and processes used in the metallurgy of zinc,

tin, nickel and cobalt. Spelter and zinc white. Tin in ingots and other forms. Alloys of tin. Nickel in ingots, bars, rods, etc.; alloys of nickel, German silver, nickel-steel, etc.

**Class 712.**—Equipment, materials and processes used in the metallurgy of aluminum, antimony, mercury, arsenic, platinum and other metals, and their alloys.

**Class 713.**—Metal plates and screens flanged, stamped, cut, decorated, perforated, etc., and their production. Production and use in metallurgical operations of wire cloth and screens. Drawn tubes and piping in iron, steel, copper, tin, lead, etc., and their production.

**Class 714.**—General foundry equipment, processes and products. The production of miscellaneous alloys.

**Class 715.**—Equipment for, and processes of washing goldsmith's dust, and dust from refiners of precious metals. Appliances, processes and products for exact rolling and beating of gold, silver, tin, and other metals. Apparatus and processes for working platinum and other rare metals.

**Class 716.**—Equipment, processes and product of electro-metallurgy; in electric smelting, the refining and extraction of metals and in metal deposition (electroplating, etc.).

**Class 717.**—Apparatus and processes (other than electro-metallurgical) for coating metals with more precious, more malleable, or more durable metals; metal galvanized, leaded, or nickel plated; tin plates (bright, dull mottled, ornamented, printed), etc.

**Class 718.**—Appliances and processes for enameling metallic objects and products.

#### LITERATURE ON MINING, METALLURGY, ETC.

**Class 719.**—Statistics and publications relative to geology, mineralogy, paleontology, topography, quarrying, mining, metallurgy, and the manipulation of mineral products, the development of water resources, etc.

#### EXHIBITS IN MOTION.

Exhibitors of machinery will be given an opportunity and are requested, however possible to display their products in motion. Facilities will be given and power of whatever kind called for, provided for this purpose.

#### SPECIAL FEATURES.

In order to bring out some of the mining appliances or material which are open to improvements or in greatest demand by miners in the west and north, and, at the same time give manufacturers an opportunity to display their products under working conditions, the following will be made special features. Provision will be made either in the Mining building or on the grounds, to represent actual working conditions as closely as possible.

Prospecting drills, churn and core drills.

Rock Drills: This covers all types and classes of rock-boring and breaking appliances.

Mucking and loading machines for tunnel and open cut work.

Hydraulic Giants: The giant is one of

the most essential parts of placer mine equipment. In its present form it is open to many improvements, both in nozzle and joint.

Turbine Pumps: In the Alaska and Yukon placer regions there are considerable areas of rich gold bearing gravel which, owing to distance from high-line ditches, are not being worked. As a rule ample water is available in the vicinity, and, if pumping apparatus suitable to meet the conditions can be provided, the gold in the ground can be won at a reasonable cost. The requirements are: Units, 50 to 100 hp.; capacity, 500 to 2,000 gals. operating under pressures of 50 to 100 lbs. Motive power is steam, electricity, hydraulics, producer gas or oil.

Thawing Points: The thawing point is a child of the Klondike—born of necessity. It is simply an iron pipe, pointed at one end with fittings at the other for the introduction of steam. It is driven into the frozen gravel and thaws it. A thawing point, in which electricity is the medium of producing the required heat, would eliminate the disadvantages of steam and be of very great value to miners in the north.

Magnetic Separators: These are needed to successfully separate, either in wet or dry form, magnetic sands from their gold or other metal content; also to separate the magnetite mixed with chalcopirite ores. This latter frequently is a bar to successful concentration.

Gold Saving Devices: A device to successfully save the light and flaked gold in the sands of some of the western rivers and beaches, would open up a productive field.

Explosives: Among the greatest requirements in the mining industry today, are fuseless dynamite and non-flaming blasting powder. Can they be produced?

The people of Seattle financed the exposition by raising \$650,000 in a single day. The capital stock was placed at \$500,000, but when it was put on the market on the morning of October 2, 1906, it was oversubscribed by the sum of \$150,000. The capital stock was increased to \$800,000, all of which will be sold in Seattle before the exposition opens.

Besides the wonders of the exposition, Seattle and the surrounding country will offer many other attractions. Beautiful Puget Sound, the wonderful lakes and snow-capped mountains will give the visitor a great scenic treat. In addition to the many places of interest in and about Seattle there are many delightful side trips that can be made in a short time and at little expense.

The principal cities of Washington and the other states of the Pacific Northwest are only a few hours or a day's journey either by boat or rail from Seattle. Victoria, B. C., a typical English city, and Vancouver, which is more like a hustling American city, may be visited in a day. Puget Sound and its connecting waterways offer beautiful scenic trips, as also does the Columbia river. There are many other little journeys that may be taken that will bring one into the heart of the mountains, where fishing and hunting may be found in abundance.

# Manufacturing Candle Box Furniture for Mines.

By MATT. W. ALDERSON.

Prospector.

The candle box is one of the things of which there is naturally quite an accumulation around every mine of consequence. In northern sections candle boxes are often used for kindling; but, as they are generally well made and of good material, it seems a shame to waste them thus, when they may be put to a better use. Many are utilized for one purpose or another in rooms of the workmen, and for seats in the mine, where men have a chance to sit when at work. There are other places where they can be used to advantage.

If one has an ordinary table for his writing desk, he will find it advantageous to have a set of two or more for drawers under one end of the table. On top of the table he may have one or more made into pigeon-holes; one with two or three shelves for writing paper, check book, letter file, etc.; another set on end for such account books as it will accommodate. Another use for them is as sectional bookcases, either by themselves or over a cabinet of drawers.

There are several places around the

*How candle boxes may be made into cabinets of drawers, useful as receptacles for many things about the mine, thus helping to systematize work.*

*Candle boxes may be made with advantage into pigeon-holes, shelves for papers and sectional bookcases.*

mine where drawers made of candle boxes are exceedingly useful. In the blacksmith shop they can be used for bolts, nuts, blanks, shoes, nails and many other things for which it is well to have a place. In the carpenter shop they are useful in providing a place for screens, nails, and the dozens of small things which it is inconvenient to have to fish out from under shavings. In the machine shop, drawers are useful as receptacles for the different sizes of elbows, tees,

sleeves, nipples, and the many little things that otherwise may be scattered and hard to find when needed.

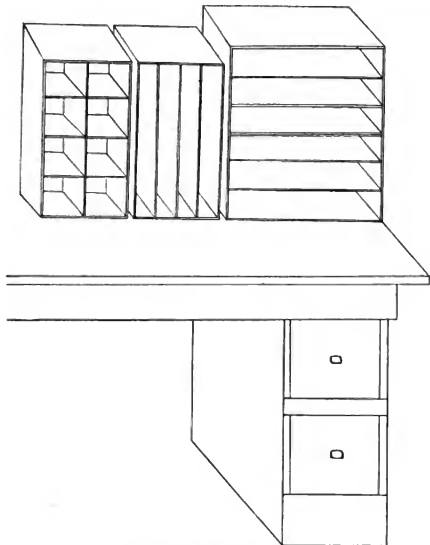
Every good manager believes in system. He has a place for things. Not only is time saved by knowing where to put one's hand on what is needed, but, when one has a place for an article and he is aware that all he has of any particular thing is directly under his eye, he knows exactly what he can depend upon. I have known men to buy pipe fittings



Fig. 1. Cross Section of a Strip.

that they had no need for whatever, because they supposed they had none in stock, when they actually had more than they needed for years in a pile of stuff that it would take time to sort over. What they supposed they were short of happened to be in the bottom of the pile.

When I am running even the smallest kind of a mine, I find it a great convenience



Office Desk, Using Six Candle Boxes.

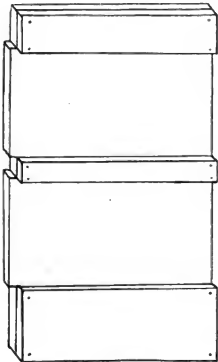


Fig. 2. Uprights.

to have nails of different sizes; and I never have them all in one receptacle. On the contrary, I have a place for each size from 3d to 60d. If there is not much use for some of the sizes, as lath nails, for instance, I buy in 5 or 10-lb. lots; and have small boxes of the several sizes in one drawer; but each size has its place and is in such a container that it may be carried to any place where there is need for it.

As a general rule, it is better to make the drawers with the end to the front.

Occasionally the space available may make it desirable to have the sides face front. The boxes should have a small piece nailed to the front, so shaped as to serve as a handhold. When the back of the box is set close to the wall, a small hole may be cut in the box for a handhold. Otherwise a strip may be put on. The advantage of having handholds on both ends is that often one may wish to pull the drawer out and carry its contents to where work is being done. With a good handhold on each end of the drawer this is easily done, even when the drawer is heavy.

Fig. 1 shows cross-section of a strip easily made and which when cut into lengths of about 3 ins. makes a good handhold.

Fig. 2 shows detail of the uprights. They are simply inch boards 18 ins. wide, 30 ins. long, gained in on the front side for the facing strips and having slats

putting the candle boxes together and smooth the sides and ends of the boxes with a plane in a few moments. With a little care he can make a very neat battery of drawers, useful for many purposes. These may be painted or stained as one prefers. A top over them of 2-in. plank makes a splendid work table.

The cost will be but a trifle and the usefulness of the arrangement will be more apparent with the lapse of time, in proportion as one maps out a good system at the start and then sees that the employees live up to it.

### Fluorspar Production.

The deposits of fluorspar thus far discovered in the United States are found only in Arizona, Colorado, Illinois, Kentucky, and Tennessee.

The three principal classes of consum-

### The Industrial Value of Mica.

BY D. B. STERRETT.\*

The total value of the mica produced in the United States in 1907 was \$392,111. This production came from 11 states—North Carolina, South Dakota, Alabama, South Carolina, Colorado, New Hampshire, Idaho, Georgia, Virginia, New Mexico, and Maine—here named in order of the value of their output.

North Carolina produced more than half of the total. Of the other states, Alabama, South Carolina, Georgia and Maine reported no production in 1907, while Connecticut is credited with no production in 1907 as against a small one Maine reported no production in 1906, largest on record. The imports in 1907 were valued at \$925,250.

The large and increasing consumption of mica is due to its greater use in electrical work. For insulating purposes it has no superior, its perfect cleavage, its flexibility, elasticity, infusibility, toughness, and softness, combined with its high nonconductivity to electricity, making the sheets especially serviceable for many forms of insulators.

Mica was probably first used in the windows of dwellings and as fronts and chimneys for lanterns. Later large sheets of mica were used in the fronts of stoves and in stove doors, and also in the lights of warships, where glass would not stand the jar of heavy guns. Mica is now used instead of glass, principally in stove lights, incandescent gas lamp chimneys, and miners' lamps. Small sheet mica is employed in making phonograph diaphragms and stonecutters' spectacles, and sheets of various sizes are used in small fancy boxes and other novelties.

Two varieties of mica—muscovite and phlogopite—are in common use. Both are satisfactory for making mica board or "micanite," as it is called, which is prepared by splitting the mica into thin sheets, systematically placing them together with shellac, and then subjecting the whole to pressure. In this way large composite sheets are made, which are as suitable as single sheets of mica for most insulating purposes.

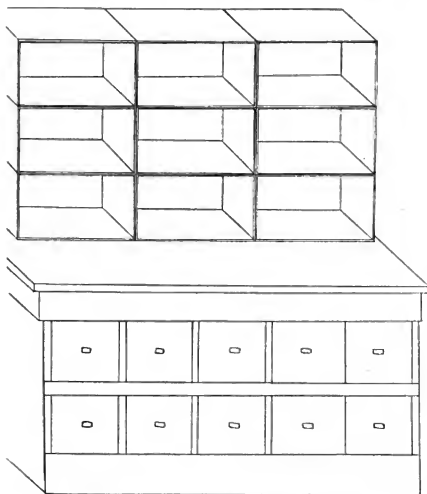
Micanite can be bent, rolled into tubes, or cut, and, of course, can be obtained in very large sheets. Small sheets of mica, punched or cut to the proper size and shape, are employed for many purposes, as for washers for lamp sockets, and large quantities are applied to such uses.

Scrap mica is ground and used for decorative purposes in brocade paints of silver, gold, and bronze colors, and for wall papers. It is especially suitable for the manufacture of lubricants and when mixed with shellac is serviceable in making many molded forms for electrical insulation, such as handles and wire insulators.

Muscovite, the white mica of commerce, is obtained only from pegmatite, a very coarse textured rock whose composition is nearly that of granite, into which it may grade.

Commercially valuable deposits of phlogopite have not yet been found in the United States.

\*Extracted from Mineral Resources of U. S. for 1907.



Candle Box Drawers With Sectional Bookcase Above.

nailed on to serve as slides for the drawers.

The other illustrations speak for themselves. In the office desk some may prefer drawers less deep than a full candle box. It is easy to cut them down and thus put three where the illustration shows two. Other combinations will suggest themselves to any good mechanic. What I give is not intended to be exhaustive, but simply suggestive.

One may countersink the nails used in

ers of fluorspar are, in order of importance, smelters and metallurgists, makers of opalescent glass and enameled wares, and chemical manufacturers.

The total quantity of fluorspar marketed in 1907 is reported at 49,486 short tons, valued at \$287,342, which represents a gain in quantity of 8,690 tons and in value of \$43,317 over 1906. The production and value in 1907 were exceeded only in 1905, when the quantity was 57,385 tons, valued at \$362,488.

# Mining Prospects in Commonwealth of Australia.

By JOHN PLUMMER,

Mining Engineer.

Although the depressed condition of the world's metal markets has exercised an adverse influence on the Australasian mining industry, especially in the Commonwealth, where the heavy import duties on mining necessities have seriously increased the cost of production and compelled several copper and other mines to become closed down, an optimistic feeling prevails in mining circles generally.

As the manager of the Broken Hill Proprietary recently observed, the lessened demand and increased cost of production have led to more efficient and economical methods of treatment and an extension of prospecting operations, more particularly in northwestern Australia and the Northern Territory (which latter has passed into the possession of the Commonwealth), also in northern Queensland.

In the Northern Territory, a party of prospectors, well provided with funds, has

*Import duties on machinery, etc., increase cost of mining and ore treatment. Effect of low metal prices on production. Government aid to mining. Prospecting in Northern Territory.*

*Consolidation of Broken Hill mines, which in 24 years produced 2,250,000 tons of lead, large quantities of silver, gold, etc.*

crop, the quantity of overburden, and the peculiar quality of the reef formation. The whole district is virgin country. That the Northern Territory is enormously rich in gold and other minerals is be-

western corner of this portion of the state, and are generally reached from the South Australian border.

White Cliffs is described as being the only opal field in the world at the present time, and since its discovery opal to the value of £4,000,000 (\$20,000,000) is said to have been obtained and sold.

Broken Hill is about to enter a new epoch in its history. The fall in the prices of the useful metals, instead of discouraging the various companies, is simply stimulating them to more vigorous effort. They are being formed into a combine, and intend smelting the whole of their ores and concentrates, instead of exporting them, gigantic works for that purpose being in operation at Port Pirie, at the head of Spencer gulf, South Australia, Cockle creek, near Newcastle, and elsewhere, while on the south coast the largest smelting works in the southern hemi-



Broken Hill Silver Mines, New South Wales.

started for Tanami, situated practically on the West Australian border, and believed to be the center of an auriferous district many hundred square miles in extent. The existence of gold in this part of Australia was discovered by some pioneer prospectors in 1900, when several reefs were located, a few of the prospects obtained being equal to 15 ozs. and 20 ozs. per ton, but the average value of the gold in the vicinity was 30 dwt.

The country is difficult to prospect in consequence of the smallness of the out-

crop, the quantity of overburden, and the peculiar quality of the reef formation. The whole district is virgin country. That the Northern Territory is enormously rich in gold and other minerals is be-

yond question, but it remains at present almost a sealed book, by reason of the smallness of white population and the utter absence of means of communication save in a few districts near the coast. In New South Wales the determination of the state government to complete railway communication between Sydney, Co-bar, and Broken Hill, will have the effect of throwing open several million acres of mineral country at present virtually inaccessible. Broken Hill, Wilcannia and White Cliffs are situated in the south-

sphere are being constructed. Spelter has been successfully produced at Port Pirie. Recently published figures show that during its 24 years' existence Broken Hill has produced 18,500,000 tons of crude ore, yielding 2,250,000 tons of lead. The ore reserves in sight are estimated at 13,500,000 tons, containing 1,350,000 tons of recoverable lead. The manager of the Proprietary recently stated that his mine had put through 800,000 tons of tailings, and produced 200,000 tons of concentrates, while the Sulphide Corporation had dealt

with 420,000 tons for 168,000 tons of concentrates. The zinc tailings dumps totalled 6,500,000 tons. Taking 4 tons of tailings to 1 ton of concentrates, thus represented, ready for work, 1,500,000 tons of concentrates, which, at an average of 45%, meant 750,000 tons of spelter. The average silver production remains unchanged.

In the copper mining industry, local smelting is on the increase. At Cobarr all the ore will be smelted in future, thus saving the heavy cost of conveying it to the coast for shipment. There is every probability that in the near future Australian shipments of ores and concentrates will become limited to a few hundred tons, if not altogether stopped.

Despite the decreased gold production

## COPPER-GOLD ORES.

	Copper.			Gold.	
	Ore.	Refined.	p.c.	Ozs.	Dwt.
Dec., 1907..	9,562	319	3.34	3,542	7.09
Jan., 1908..	10,538	350	3.32	4,218	8.64
February ..	15,308	448	2.94	5,152	6.60
March .....	17,512	591	3.37	6,567	7.51
April .....	16,338	535	3.27	6,152	7.53
May .....	19,176	626	3.26	8,216	8.56

## VALUE OF OUTPUT.

Dec., 1907 (copper at £60) .....	£62,800 = \$ 314,000
Jan., 1908 (copper at £62) .....	64,400 = 222,000
Feb. (copper at £58) .....	74,300 = 371,500
March (copper at £59) .....	83,200 = 416,000
April (copper at £58) .....	83,500 = 417,500
May (copper at £58) .....	99,600 = 492,000

Total for half year, £466,800 = \$2,324,000

With the extension of the railway system in the northern districts, the enormous

causing numbers of mines to be more extensively worked, thereby minimizing the decline in the aggregate production. At the same time a stimulus is being afforded, with government assistance, in the northwestern portion of the state, which is known to be largely auriferous, and although it is doubtful whether another Kalgoorlie will ever be discovered, there is every probability of good payable reefs being struck. In Victoria the auriferous production is being well maintained, but no discoveries of importance have been recorded, although it is not improbable that with improved methods of ventilation, deep lead mining will show a considerable expansion.

South Australia has suffered much from the slump in copper, but, as in the other



The First Smelter at Broken Hill, New South Wales.

in Queensland, the other mining industries of the state are promising well, Mount Morgan, with its great wealth of gold-copper ores, holding the pride of place. The total value of the product for May last, taking copper at £58 per ton, was £98,600 (\$493,000). The figures for the six months ending May 31 were as follows:

## GOLD ORES.

	Tons.	Yield Gold.	per ton Dwt.
December, 1907 ..	15,922	7,371	9.25
January, 1908 ..	21,526	6,358	5.18
February .....	20,378	6,460	8.24
March .....	21,229	5,141	4.84
April .....	20,095	6,500	6.49
May .....	21,783	6,800	6.24

mineral wealth known to exist therein will begin to be more systematically exploited. The great difficulty, as in several of the other states, has been the heavy cost of fuel and inefficient, or absence of, means of transport and water conservation.

The copper deposits are believed to be more numerous and extensive than originally supposed. It is the same with the coal deposits, which are likely to play a more important part than hitherto in the development of state mining enterprise, by enabling smelting operations to be conducted on a less expensive basis.

In West Australia the remunerative treatment of low grade auriferous ores is

states, endeavors are being made to reduce the cost of production.

In Tasmania the lead and copper output has been affected by the low market prices, but, as a sub-development work is being steadily continued in the hope of an early improvement.

On the whole, the Australian mining industry has suffered less than might have been anticipated, while the prospects of substantial improvement in the near future are most encouraging.

In Germany miners have been receiving old age pensions since 1890. The pension is only 11 cents a day, and is paid when the miner becomes 71 years of age

# Production and Dividends of the Cobalt Mines.

By ALEX. GRAY.

Analysis of the Cobalt output figures for the first half of 1908 and previous years, and a revised list of issued capitals and dividends paid by productive companies, offer instructive data to the investor and admonition to the speculator. To be brief and to the point, we have this to present in recapitulation:

## SILVER OUTPUT VALUES.

1904 .....	1,136,217
1905 .....	1,435,570
1906 .....	2,572,908
1907 .....	5,900,000
1908 (first half) .....	2,900,000
<b>Total .....</b>	<b>\$14,995,695</b>

## DIVIDEND AVERAGES ON CAPITAL.

Issued capital of 25 companies appearing in output since 1904 \$69,716,238	
Dividends paid by 13 of these companies .....	5,551,701
Dividends paid privately by La Rose, O'Brien and Drummond .....	2,500,000
Dividends paid by 13 companies first half 1908 .....	1,504,591
Tonnage shipped by all companies to July 1, 1908 .....	31,523
Percent .....	
Average dividend since 1904 on issued capital of 25 companies .....	7.97
Average dividend of 13 dividend-paying companies .....	22.55
Average dividend of 13 dividend-paying companies, including La Rose, O'Brien and Drummond .....	32.50
Average dividend first half 1908 on capital of 13 dividend-paying companies .....	6.12
Average dividend prior to 1908 on capital of 13 dividend-paying companies .....	16.41
Dividend per ton shipped to Dec. 31, 1907 (excluding La Rose, O'Brien and Drummond) .....	\$174.23
Dividend per ton shipped to July 1, 1908 (estimating La Rose, O'Brien and Drummond) .....	225.43

## INDIVIDUAL CO. CAPITALS AND DIVIDENDS.

Name of Companies.	Capital- Issued.	To July 1, 1908.	First half 1908. Per cent.
Buffalo .....	\$90,000	24.00	6.00
City of Cobalt .....	435,500	5.00	5.00
Coniagias .....	4,000,000	17.00	6.00
Crown serve .....	1,750,000	4.00	4.00
Foster .....	515,588	5.00	...
Kerr Lake .....	2,000,000	22.00	6.00
McKinley-Da- nach .....	2,500,000	11.77	8.00
Nipissing .....	6,000,000	37.46	9.00
Right of Way .....	492,518	7.90	7.90
Silver Queen .....	1,500,000	13.00	5.00
Tremblant .....	2,500,000	6.00	3.00
Tremblant and Hudson .....	8,110	957.00	153.00
Bay .....	94,000	8.46	...
Tretheway .....	...	...	...
<b>Total .....</b>	<b>\$24,657,166</b>	...	...

To the student these figures are sufficiently luminous. They are more so to the mining man who is familiar with the status of the 13 companies on the list, and the 22 others representing issued capital totalling \$45,059,172, and not yet distributing profits—leaving the La Rose, O'Brien and Drummond to be surmised as to the extent of their return to owners. Three privately owned concerns have paid out over 40% of the grand total of distributions, nine of the 13 other companies made up the bulk of what the public have received. Were it not for the 22 in the background, the presentation would be more favorably regarded, although a half dozen of the public companies have done no more than main-

*Silver production from 1904 to July, 1908, amounted to \$14,995,695, and dividend payments to \$7,551,701. Large royalties collected by Ontario government.*

*Output of gold, nickel, cobalt, and arsenic. Government mineral land. Operations of the Coniagias and La Rose Consolidated mines.*

tain their position during the half year just closed.

Twelve per cent without ore reserves or other adequate factors as reassurances, make the ciphers in many of these capital issues more globular. By deducting the output to the end of 1907—32,215 tons—from the grand total to date of 31,523, we get 8,308 tons as the output for the first half of 1908, which is 26% of what the camp has shipped since the beginning.

In some respects it would appear as if the Cobalt mines had shipped less *pro rata* during the half year period. This is due to the Coniagias, Buffalo and Cobalt Central companies having their own concentrators which treat 150 to 175 tons per day. What seems a loss in average tonnage, therefore, really represents savings in treatment charges, recoveries, freights and progressive expansion in outputs. What formerly went to dumps now becomes liquid assets immediately realizable. One regrettable development, and one that must be reckoned with in connection with refusal of metallurgical plants to account for the nickel content, is the drop in the price of cobalt oxide from \$25.50 to \$14.50 per lb., leaving mine owners in somewhat of a quandary as to what they will do with their byproducts.

The existence of the concentrators, in the absence of regular statistics supplied to a central organization or the government, at other fields, leaves the actual results for the half year in doubt. Inevitably the value of the silver-cobalt product has to be approximated, the Coniagias being the solitary exception, in that the management has supplied me with most gratifying data. Not only is the Coniagias' daily output of concentrate valued at \$1,000, but the mill is to be en-

mining on July 17, 1905, and on Dec. 31, 1906, had shipped 434,913 tons, valued at \$889,496. From Dec. 31, 1906, to Dec. 31, 1907, the company shipped 2,545 tons, valued at \$782,368. From Dec. 31, 1907, to June 29, 1908, the shipments were 319,612 tons, concentrates and high grade ore only, estimated at a value of \$450,000. The Coniagias Mines, Ltd., began paying dividends in May, 1907, since which date it has paid eight dividends amounting to \$640,000, and one bonus of \$10,000, making a total of \$680,000.

The Cobalt Central is expected to declare a dividend in the near future. Its mill is treating high as well as low grade rock, and the same is true of the Buffalo, the latter also shipping first class ore to smelters.

Chief interest, however, apart from the Nipissing, centers in the La Rose, because of the recent amalgamation, and we now have Prof. Hidden's report on its reserves and earnings. According to Prof. Hidden the La Rose from Jan. 1 to June 1, 1908, produced 1,515 tons, averaging \$250 per ton, or at the rate of over \$557,500 a year. In 1904 the mine produced 90 tons; in 1905, 607 tons; in 1906, 854 tons; in 1907, 2,815 tons, and from Jan. 1 to June 1, of 1908, 1,515 tons. There is blocked out on one vein alone silver valued between \$2,500,000 and \$3,000,000. Since the discovery of the mine in 1903 there has been taken out silver valued at \$1,250,000, of which 88% was actual profit.

To add to the interest relative to Prof. Hidden's estimates the president of the La Rose Co. is out with a statement of the earnings of the La Rose mine as follows: From July, 1904, to May 31, 1908, ore shipments had a value of \$1,541,519. Then the partners divided in 1905—1905 returns of shipments sent under partnership agreement—ore had a value of \$80,000. Ore shipped in May, 1908, \$118,821. Total earnings, \$1,740,340. To mine, ship and treat this ore cost \$535,478, leaving \$1,204,862. According to this the profits were 70% of the total value and not 88% as Prof. Hidden is quoted as putting it. What is of more importance, however, is the extract from the report of Messrs. Watson & Watson, certifying that the La Rose has ore reserves representing profits of \$2,017,878 all located as follows:

## LA ROSE ORE RESERVES AND PROFITS.

Practically Developed—	Tons.	Total ore.	Gross value at 55c.	Estimated Profit.
Main Vein .....	4,045.40	2,902,310	\$1,596,210	\$1,152,893
No. 3 Vein .....	225.20	600,226	363,125	323,388
McDonald Vein .....	2,759.02	835,500	459,725	211,427
No. 10 Vein .....	19.50	97,500	53,625	48,994
<b>Total .....</b>	<b>7,049.12</b>	<b>4,196,536</b>	<b>\$2,308,695</b>	<b>\$1,735,712</b>
Indicated Ore—				
McDonald Vein .....	2,282.15	616,529	338,541	240,961
No. 3 Vein .....	16.40	82,000	45,100	41,205
<b>Grand total .....</b>	<b>10,358.17</b>	<b>4,894,065</b>	<b>\$2,691,736</b>	<b>\$2,017,878</b>

larged and 30 stamps installed. Another \$1,000 worth of rock is shipped daily on the average to the company's smelter at Thorold, and at this rate this mine is setting a standard for Cobalt. It began

It is not to be supposed that the 1908 average value is truly representative of La Rose rock any more than it is clear why La Rose should have an actual profit of 88% and the Nipissing only 73%, if we



accept the latter's balance sheet. Had mining and metallurgical charges over the years been given, the figures would be more conclusive, whereas the inference is that stopping in 1908 was done at the expense of development charges in the previous period. The former superintendent of the La Rose distinctly stated that La Rose mining and development averaged \$100 per ton shipped. Consequently Prof. Hidden has not made it clear whether the 12% covers all contingencies. The La Rose could double its output, were that advisable, until what is beyond the \$2,500,000 to \$3,000,000 reserves is demonstrated. To place its ore on a basis of \$250 per ton, less 12%, demands rapid developments at the other units in the La Rose Cons. Co., if 12 to 15% is to be maintained for the benefit of shareholders continuing until capital and interest are recovered. That is the inference Prof. Hidden has left, and it might have been wiser for those most concerned to publish the detailed figures from the face to the furnace. It may reasonably be supposed that the La Rose Extension, University, Princess and other units will eventually supplement La Rose profits, but it is the interregnum that investors would know about.

What the O'Brien paid to the provincial government as its share on account of the royalty of 25% is the only clue obtainable as to profits. The Drummond was not so fortunate as the La Rose and O'Brien mines; yet an offer of \$2,000,000 was declined the other day. The Drummond owners stipulated that their name should no longer be used in connection with the mine. This name being one of the most valuable assets, the deal fell through.

It is safe to place the profits of this trio of mines at \$2,500,000, and by adding the payments to the Temiskaming & Northern Ontario railway by the Townsite, City of Cobalt, Nancy Helen, Right of Way and other mines on Cobalt premises, the grand total of Cobalt's contributions in dividends and royalties to shareholders, the railway and the government, will not fall far short of \$9,000,000. To the end of 1907 Cobalt had produced silver worth \$11,000,000. To the end of June, 1908, the value of the silver was \$14,500,000, notwithstanding one or two mines are supposed to have devoted a good deal of their energies to development work while the price of silver was so low. Now they are worried over the price of cobalt oxide. In view of all this the dividend total in proportion to output is regarded in a favorable if diffused light. That it is adversely affected by capital issues, which are too heavy an offset against dividends and rich sections not permanent enough to carry the burdens imposed is undeniable. Really \$701,420 of the Temiskaming & Hudson Bay Co.'s total is in the nature of extraordinary revenue. That amount was the price paid by the Silver Queen Co. for some of the ground it holds and operates. To take out of the dividend column and cross entry some of it with what the Silver Queen has distributed, brings the percentage of profits to a level suggesting rational estimates of what the camp will, and what the camp can do.

Directly and indirectly, the Provincial government has the best of the partnership with the mining industry, for the proving of the country will ultimately bring the Gillies tract into the market, and the O'Brien and Chambers-Ferland royalties, combined with the \$2,500,000 received from the sale of the Cobalt Lake, Kerr Lake and other rights, plus what the government railway is getting from the Right of Way, Townsite and other mines, will help to keep the official pot boiling.

Contemporaneously, the Montreal River section, and the South Lorrain areas, will

According to these figures it has cost participants in the gold ventures of this province \$168 over these years to recover a dollar's worth of gold. The purchasing power for Ontario "raw" gold has its limitations under such circumstances. It is not surprising that the many more who learned of the losses incident to the undertakings have refrained from mining. On the other hand silver in Ontario furnished incentive to renew the exploitation of the resources of that province, these figures being in pleasing contrast to those bearing upon gold mining:

ONTARIO PRODUCTION OF SILVER, ETC.										
Year.	Shipped.		Nickel.		Cobalt.		Arsenic.		Silver.	Total.
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Ozs.	Value.	Ozs.	Value.
1904	158	14	3,467	16	19,860	72	5,903	204,875	\$ 131,887	\$ 126,217
1905	2,114	75	10,060	118	100,000	549	2,692	2,451,356	1,260,503	1,273,196
1906	5,335	160	.....	321	80,794	1,410	15,858	5,401,756	3,667,551	2,761,113

ONTARIO GOLD MINING STATISTICS.					
Schedule.	1902.	1903.	1904.	1905.	1906.
Mines worked, number.....	29	19	12	13	14
Ore treated, tons.....	48,511	32,347	.....	17,510	31,791
Gold product, ozs.....	83,625	10,352	2,285	5,541	3,926
Gold.....	\$229,329	\$188,026	\$40,000	\$59,582	\$66,393
Men above ground, number.....	241	243	190	175	147
Men below ground, number.....	286	256	124	154	97
Wages paid.....	\$343,394	\$245,520	\$152,000	\$176,818	\$152,011

doubtedly present ore bodies in shipping quantities, so that what Cobalt inaugurated promises more than skepticism will concede and reckless promoters deserve. Hence the increasing necessity for reliability of technical data, and the termination of the careers of the systematically perverse. A camp that can provide most of its own working capital—"curb" clients do not see this—and distribute \$8,000,000 besides, in the face of metallurgical losses that would almost involve a bank in insolvency if a corresponding amount was regularly written off as bad debts, appeals to the student of mining economics and the fancy of the speculative investor. The output figures show what two or three years have accomplished. Only now are the savings possible in treatment and broader metal markets receiving the consideration they merit.

Altogether therefore, Cobalt enters upon the sixth year of its existence—although not of its activity—with more hope, certainty and safety. No doubt the La Rose amalgamation and the O'Brien will establish new standards as regards working costs and smelter returns, in which direction there is room for radical improvements.

Ontario has at last a silver and copper-nickel industry that will serve as a surer basis for expansion. More responsible technical direction will inspire the respect and confidence of the discriminating investor. Canadians, heretofore somewhat indifferent to the mineral resources of their country, will not be so. One source of their trouble has been that what metal mining was undertaken previously was either overdone speculatively, or done so inadequately failure was certain. We have the concrete evidence of this in the official data referring to the operations of the gold mines, or prospects in the province of Ontario, where there is a keener disposition to branch out in all things promising reward for enterprise. While silver mining has been forging ahead, and the copper-nickel district is an interna-

tional institution, gold winning has experienced these vicissitudes.

For the long pull Ontario has more to look for in its copper-nickel ores, of which it is claimed there is a superabundance, railways alone being required to bring them to smelters. Here again, there has been conflict between statisticians somewhat disconcerting to the truth-seeker.

It will be noted that the general table bearing upon Ontario's mineral products places the value of the copper output of the province at 9.18% of that of the Dominion; but if we take the basis of calculation adopted by the Dominion statisticians, then Ontario's copper value is very much more. The difference is as \$1,045,511 is to \$2,950,000 in 1907, and \$806,413 to \$2,025,000 in 1906. The disparity of almost 200% as to copper is more noteworthy when the figures as to nickel are reviewed. Ordinarily officials are chary about the credit of their domain. The Ontario authorities lean backwards. They make the value of the nickel-copper matte much less than the Dominion statisticians concede to it. Perhaps the totals in each instance are wide of the mark. There are arguments against both methods of arriving at the results as given, but what concerns us is that intelligent comparisons and records of relative value are unobtainable by investors.

At any rate Ontario is too modest as to its copper-nickel ores. This province, despite all this, has mineral industries with products exceeding \$20,000,000 in value, as against Quebec's \$5,301,368 for everything, including building materials. One half of Quebec's aggregate belongs to the asbestos and mica mines, and here again the product is valued regardless of its selling price.

Formosa produced last year 42,310 ozs. crude gold, and 19,168 ozs. crude silver. In 1906 the output of gold was 48,132 ozs. and of silver 14,882 ozs.

## Harvesting Placer Gold in Oregon.

BY DENNIS H. STOVALL.

The time for the annual cleanup in the hydraulic placer mines of southern Oregon has arrived, and the harvesting of the gold is now on. The winter was one of continual rains in the lowlands and deep snows on the mountains, giving an abundant water supply. So the giants have thundered day and night for the past seven and eight months.

The total yield of virgin gold from southern Oregon this year will be fully \$1,000,000. As most of the miners ship their output direct to the mint or to the refinery of other states, Oregon derives but little credit so far as the mint reports are concerned.

The old channels and beds of ancient streams, which comprise the placer diggings of this district, are the largest and most dependable of any mineral section of the world. It is a mistaken idea that the placer fields of southern Oregon or of northern California, which are really one district, are worked out. They are worked out to the methods—the rocker

property. The hydraulic placer season in southern Oregon is covered only by the winter months, when the rains are heavy and there is a good depth of snow on the mountains.

In the larger mines, the giants once started never cease their roar from end to end of the season. Night and day they play their powerful streams upon the gravel banks. For night work the diggings are lighted by electricity, arc lamps of 1,000 candlepower being used. Most of the mines so lighted have their own lighting plants, the dynamo generating the current being driven by power from the main pipe-line. Some of the mines employ locomotive headlights and burn carbide instead of oil.

During the season of mining many of the miners do not molest the riffles or sluices, leaving the entire cleanup till spring. As the dirt and gravel are washed from the banks, they are carried by the giants' flood down the bedrock race to the sluices, whence the mass is led over the riffles to the dump. The natural riffle of the bedrock is the best possible riff-

le enough to assist in cleaning is allowed to flow through the sluices. The mass of gold, gravel and black sand on the floor of the sluice is swept gently to and fro. The light gravel and dirt are carried away by the sluice water, leaving only the black sand and gold. The sand is first panned for its gold, and panned the second time very carefully over a vat or tub, for its platinum values.

The quicksilver in the sand and gold is saved, or a considerable portion of it, by squeezing through leather bags. The amalgam is removed from the nuggets by a slight heating over a forge fire. The gold is then placed in jars, and is ready for shipment to the mint.

## Prize for Mineral Collection.

A prize of \$100 in cash is offered by J. B. Tyrrell, mining engineer, of Toronto, for the best collection of minerals from the province of Ontario during the year 1908, by any one not employed as a collector by a public institution or dealer in minerals.

The collection must contain at least 30 mineral species, and it is suggested that where convenient the size of the specimens should be 2 by 3 ins.

Each specimen must be labeled with the exact locality from which it was obtained, and the date on which it was collected. No specimen will be considered unless it is so labeled.

A typewritten list of the specimens, with names of minerals and localities, in triplicate, together with a declaration stating that they were personally collected by the signer of such declaration in Ontario in 1908 at the localities stated, with the postoffice address of the collector, must accompany each collection.

The collections must be addressed: "Examiners, Tyrrell Prize, Government Assay Office, Belleville, Ont.," and must be sent prepaid, to the Government Assay Office, Belleville, Ont., on or before Dec. 1, 1908, where they will be opened and examined jointly by Prof. Nicol, of the School of Mining, Kingston, and Dr. Walker of Toronto University.

If requested the collections will be returned, charges collect, as soon as possible after the prize is awarded.

## German Zinc Trade.

The foreign trade of Germany in zinc and zinc products for the first five months of this year is reported by Paul Speier of Breslau, as below, in metric tons:

	Imports.	Exports.
Zinc ore .....	70,881	9,254
Spelter .....	10,724	24,206
Sheet zinc .....	127	6,737
Zinc scrap .....	610	2,321
Zinc dust .....	377	935
Lithopone .....	1,685	3,698
Zinc oxide .....	2,610	6,357
Arkansas .....		

Compared with the first five months of last year, the imports of zinc ore show a decrease of 2,824 tons; while the exports of spelter record a falling off of 1,302 tons.

The zinc dust market remains quiet, and prices f. o. b. Stettin are 38 to 38½ marks per 1,000 kgs. (\$4.11 to \$4.16 per 100 lbs.). The production for the first quarter this year was 994 metric tons, which compares with 923 tons in 1907.



A Southern Oregon Placer Mine in Operation.

and shovel—of the early day miner. But the deep deposits, the old channels that carry gold, and which were beyond the reach of the pioneer miner and his pick and shovel, are left for the giants—the hydraulic giants of modern times.

One giant can wash down more gravel in an hour than the old timer, with his pick and shovel, could move in weeks. It costs from 2 to 5 cents per cu. yd. to tear down and mine a mountain of antiferrous gravel by the hydraulic method. The gravel pays from 6 to 20 cents, and oftentimes 60 cents per yd. There is no phase of mining in which the risk is reduced to so small a minimum. The placer miner can determine the exact value of his ground beforehand; and if he knows the capacity of his giants and the length of his run, can figure, almost to a dollar, the amount of his cleanup before the riffles are lifted.

As the amount of mining done and the size of the cleanup are dependent upon the water supply—other things being equal—the miner who has the best supply for the longest season is the owner of the best

file for catching gold, and it is here that a great percentage of the nuggets find lodgement.

The sluice boxes are set at the end of the bedrock race. Specially prepared riffles, made of steel, are used by many; but the old time pole and block riffles are most used.

To clean up, the bedrock race is first swept clean, and every particle of precious yellow gathered up. For this purpose a fire hose, with a head of water from the main pipe-line is used. Small brushes are employed to clean the light gold from the small crevices, the sand and dust being all swept into the race and washed down into the sluices. Because of their extreme patience and care, Chinese miners are adepts at cleaning up.

Mine managers frequently slight or leave their bedrock entirely, and lease the cleanup privilege to Chinamen on a percentage basis. The Chinamen work all summer at the task, and are content if they make an average daily wage of \$1.

After sweeping the bedrock, the riffles are then lifted and rinsed. Only water

## Coal Mining Industry of Arkansas.

BY E. W. PARKER\*

The coal production of Arkansas in 1907 was the largest in the history of the state, amounting to 2,670,438 short tons, having a spot value of \$4,473,693, and exceeding that of 1903, which has heretofore held the record by 441,266 tons in amount and \$1,112,862 in value. Compared with that of 1906, the production shows an increase of 806,170 tons, or 43.3%, in quantity, and of \$1,473,354, or 49.11% in value, the percentage of increase over the output of the previous year being greater than in any other coal producing state except Michigan.

The average price per ton received in 1907 was also the highest in recent years—\$1.68 as against \$1.61 in 1906, \$1.49 in 1905, and \$1.54 in 1904. If the records of the coal mining industry may be taken as an indication of general industrial conditions in the state, the year 1907 was exceptionally prosperous.

The coal mines gave employment in 1907 to 5,085 men, who worked an average of 190 days, as against 4,298 men working an average of 165 days in 1906, and 4,192 men for an average of 177 days in 1905. The average production per man in 1907 was 525 tons, as against 433 tons in 1906 and 461.5 tons in 1905; and the average tonnage per man per day in 1907 was 2.76, as against 2.63 tons in 1906 and 2.6 in 1905. For the last five years practically all of the mines have been operated on the basis of an 8-hour day, and during this same period no machines have been used in mining.

Attempts to improve the quality of coal by washing were reported by one company, which had in operation four Stewart Jigs, handling 92,848 tons of coal and obtaining 69,636 tons of cleaned coal and 22,212 tons of refuse. In 1906, 36,309 tons of coal were washed, the resulting product being 27,711 tons of cleaned coal and 8,598 tons of refuse.

On account of a change in the state mine inspectorship, accident statistics are incomplete; but R. A. Young, the present inspector, reports that for the six months from July 1 to Dec. 31 ten fatal and six nonfatal accidents occurred. Five of the fatal accidents were due to explosions of gas, one resulted from an explosion of powder, one from fall of roof, one from a shaft accident, and two men were crushed by cars. Assuming that the production of coal and the number of men employed were about the same during the first six months of the year as in the last, the death rate per 1,000 employees was 3.93.

Arkansas, Missouri, and Iowa were for two decades (1840-1860) the only states west of the Mississippi river reporting production of coal. That the industry developed very slowly in Arkansas is shown by census reports, which gave a production of 220 tons in 1840, 200 tons in 1860, and a total of 14,778 tons in 1880. During the last 20 years, with the exception of 1901, 1905, and 1906, the production has increased rapidly, reaching the maximum, as above stated, in 1907.

## Colliery Notes.

President Jones of the Coal Mining Institute of America, in an interesting address at the regular summer meeting at Greensburg, Pa., commented on coal mine accidents. He stated that our greater death rate than Great Britain and Germany, per 1,000 men employed, is due, first, to the fact that our workmen, owing to our methods, accomplish more; and, second, our workmen are 75% foreigners, speaking in different tongues, and are not homogeneous in character. Often accidents are due to lack of discipline. Sometimes the workmen are impatient of restraints and resent discipline. Fully 50% of the mine accidents are due to the carelessness of the victims.

There has been added to the "permitted list" of explosives for use in British collieries, "Permonite II," which consists of the following mixture: Perchlorate of potash, 31 to 33%; nitro-glycerine, 3 to 4%; nitro-cotton, 0.1 to 0.5%; ammonium nitrate, 39 to 42%; tri-nitro-toluol, 11 to 13%; starch (dried at 100 Cgs. C.), 7.5 to 8.5%; wood meal (dried at 100 Cgs. C.), 2.5 to 3.5%; moisture, not more than 2.5%. This explosive is to be used only when contained in (a) a wrapper of stout paper thoroughly waterproofed with paraffin wax, ceresine wax, resin, and mineral oil; or (b) a case of nickel thoroughly waterproofed with paraffin wax and ceresine wax. It is to be fired with a No. 6 detonator.

The selection of the best binder for manufacturing briquets depends on the locality, character of the coal, and the purpose for which the briquets are intended. According to the investigations made at the government fuel testing plant at St. Louis, the cheapest binder is the heavy residuum from petroleum, often known to the trade as asphalt. Four per cent. of this binder being sufficient, its cost ranges from 45 to 60 cents per ton of briquets produced. This binder is particularly available in California, Texas, and adjacent territory. Second in order of importance comes water-gas tar pitch. Five to 6% usually proving sufficient, the cost of this binder is from 50 to 60 cents per ton of briquets made. As water gas pitch is also derived from petroleum, it will be available more particularly in oil producing regions. Third in importance is coal tar pitch. Being derived from coal, this binder is very widely available. From 6.5 to 8% will usually be required, and the cost ranges from 65 to 90 cents per ton of briquets produced. Of local importance, where the price permits, are natural asphalts and tars derived from wood distillation. Wax tailings could be used with an easily coking coal. Pitch made from producer gas tar will make excellent briquets, with a lower percentage of binder than other coal tar pitches. Briquets excellent in all respects except that they are not waterproof can be made by using 1% of starch as a binder, the cost of which is 20 cents per ton of briquets produced. Extra care is necessary in drying and handling these briquets, and this adds to their cost. The waste sulphite liquor from paper mills also produces excellent briquets except that they

are not waterproof. Of inorganic binders, magnesia might be utilized, as its probable cost would not exceed 22 to 30 cents per ton of briquets produced. Other inorganic binders, while available as regards price, would not make first-class briquets.

## Government Tests of Concrete.

Numerous recent accidents in building construction, owing to the failure of concrete, give special interest to a bulletin (No. 314) just issued by the United States Geological Survey, showing the results of tests of the strength of concrete beams under many varying conditions.

The work reported on consisted of studies of the constituent materials of concrete, its strength when molded into various structural shapes, and of the methods by which its maximum strength might be developed through various forms of metallic reinforcement.

The tests indicate that concrete is unsuitable for use under conditions where it must resist tensile stresses, because of the small loads it will sustain, and particularly because of the suddenness with which it fails, in striking contrast to the behavior of reinforced concrete, which usually shows a gradual development of cracks preceding failure.

An attempt is made to bring out the comparative values of gravel, granite, limestone, and cinders for use in concrete; the effect of age and consistency on strength, as shown by the modulus of rupture of the long and short beams and by the ultimate strength of cylinders and cubes; and the influence of age and consistency on stiffness, which is indicated by the elongation and elasticity.

The purpose of this series of tests is to determine (1) the effect of age on the strength of concrete; (2) the effect of variation in the consistency on the strength of concrete; and (3) the effect of different types of aggregates on the strength of concrete.

The first question is perhaps the most important, since an early attainment of considerable strength and no subsequent decrease in it are essential qualities in concrete, indicating how soon a structure may be put to the use for which it is intended. Many of the accidents reported have apparently been due to putting too early a strain on green cement.

No attempt is made to generalize the results of the tests nor to draw any conclusions, however warranted they may appear from an examination of the data presented. It is expected that the bulletin will provoke discussion, and in order to promote this, extended expressions of opinion or attempted applications of theory to results have been avoided. A running commentary on the results of the tests, however, emphasizing points of particular interest and indicating a few that might lead to interesting conclusions, is included in this report. When the results of 52-week tests now in progress become available a thorough analysis of the entire series will be published in another bulletin.

\*Extract from *Mine and Resources of U. S.* for 1907.

## Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

### ONTARIO INSPECTION OF MINING CLAIMS.

The Editor:

Just a few last words, with your permission, in answer to Mr. Gibson's letter in The Mining World of June 27 in which he accuses me of misrepresentation of facts, but without giving any specific instance, possibly on the principle that when you cannot prove that your opponent is wrong abuse him. Such general accusations are so rare nowadays, except among politicians in the heat of a political struggle, that it is impossible for me to recall any precedent on which to deal with them. Possibly Mr. Gibson has inadvertently used one of the phrases fixed in his mind during the recent election in this province.

It is a pity that Mr. Gibson in his high official position, and with the great power that position gives him, should insist on devoting his energies to denying the imperfections of the Ontario mining law, no matter how clearly those imperfections are pointed out to him, rather than to remedying these imperfections.

In my original article, in order to avoid any suspicion of misstatement, I quoted the judgment of the commissioner. I judged in full as sent me by him, and with his knowledge and consent. In later letters received from him and his secretary he informed me that the "reasons accompanying my decision" were on file and that a copy of these could be obtained by paying for it; but as my engagement on the case was terminated, and as the "reasons" for the decision did not affect the facts of the case, they were not purchased.

The claim used as an illustration by me was staked by a man named John Gray, one of the best prospectors in Ontario, and in his sworn evidence before the court he stated that he found both silver and cobalt bloom in the vein staked by him. But the judge, for some reason best known to himself, states in the "reasons" quoted by Mr. Gibson, that this evidence did not impress him favorably. In stating that such evidence was given it was quite impossible for me to guarantee that the judge believed it. The evidence was given, and in my opinion was and is true. On this point of credibility I do not agree with the judge, who was called upon to decide the question, and doubtless decided it to the best of his ability. But many such decisions are wrong or there would be no object in having courts of appeal.

Apparently, according to Mr. Gibson, anyone who expresses a statement at variance with the opinion of a judge is a distorter of the truth in the superlative degree, though as between judges themselves he would scarcely like to express such an opinion.

But Mr. Gibson deliberately closes his eyes to the main question discussed in my letters, which is: Does government inspection of the discoveries of prospectors work out well in practice, or does it not?

In the instance cited, a mining engi-

neer was engaged to inspect a "discovery" on a vein. On being asked whether it was worth development or not he said "yes," and development was proceeded with. The judge, who would hardly claim to be an expert on the value of mines or mining property, said "no," as shown in the "reasons" quoted by Mr. Gibson. At the same time he declared that a point on the same vein 18 ft. away was worth developing, took the property from the first staker and gave it to a subsequent staker who staked at the latter point.

The judge probably interpreted the Ontario mining law correctly; but a law which lends itself to such an interpretation is absurd, and cannot but have a most discouraging effect on honest prospecting and generally on the development of the mining industry of the province.

A mining law which must be so interpreted gives point to a statement made by Dr. R. W. Raymond, probably the best authority on mining law in the world, in a recent article in The Canadian Mining Journal: "I think that the requirement, under the circumstances, of the preliminary discovery of a mineral deposit, is not only unnecessary, but harmful." And also to that of T. F. Van Wageningen in The Mining and Scientific Press, that "In Canada, ———, there are claim locators, denouncers, pagers and mineral land appropriators operating under other names, who occasionally by pure accident run upon a new deposit of ore, or who acquire and explore land in the vicinity of such an accidental find, but as for real prospecting in these lands there is none in progress."

J. B. TYRELL.

Toronto, June 30, 1908.

[The discussion of the case at issue is now closed. Further opinions on the mining law of Canada, as well as of the United States, with regard to the rights of a discoverer, are welcome.—Editor.]

## Patents Relating to Mining.

WEEK OF JUNE 30, 1908.

Electric Furnace Method. Frederick M. Recker, Niagara Falls, N. Y., assignor to Electric Metallurgical Co., a corporation of West Virginia. (892,212; filed Jan. 8, 1908.)

Concrete Mixer. John Fieh. South Bend, Ind. (892,229; filed June 29, 1907.)

Furnace Tapping Spout. Charles C. Johnson. Redding, Cal. (892,263; filed Sept. 4, 1907.)

Explosive. Winfield B. Pierce. Seattle, Wash., assignor to Union Powder Company. Seattle, Wash. (892,302; filed Aug. 8, 1907.)

Sand Pumping Plant. Martin Swinick. Des Moines, Iowa. (892,329; filed Sept. 23, 1907.)

Mineral Fertilizer. John A. Wendel. Milwaukee, Wis. (892,342; filed Oct. 2, 1907.) This fertilizer consists of burned and comminuted primary rock, dolomite, phosphate, sodium sulphate exsiccated, calcium sulphate, ferrous sulphate, magnesium sulphate, calcium carbonate, silicic acid or silicic acid and kalin.

Oil Well Pumping Mechanism. Daniel R. Rikard. Vanburn, Ind. (Original application filed June 16, 1906. Divided and application. 892,354; filed March 11, 1907.)

Method of Treating Cold Crude Petroleum or Distillate thereof to Obtain an Explosive Mixture for Internal Combustion Engines. Ian Marlin. London, England. (892,373; filed June 10, 1907.)

## Legal Decisions.

Working Mines; Injury to Surface.—Where the evidence failed to show that the owner of the minerals in working the mines understood the right created or contributed to the injury of the surface, it was said to be immaterial whether the owner of the surface was entitled as an absolute right to subaerial and lateral support to the surface, or whether, having purchased mining claims which had been surveyed and monuments erected, and for which patents had been issued; but a variance was discovered between the ground conveyed by the patents and the ground intended to be denounced. The purchasers were not estopped because of the contract of purchase, from denouncing claims covering the territory intended to be included by the vendor in their claims, and from acquiring title to the property adversely to the vendors. *Butlerfield vs. Nogales Copper Co., Arizona.* 95 Pacific 152.

Mining Claim; Possession.—Where actual possession was not taken by a purchaser under a contract to purchase mining claims not described by meter and bounds, such purchaser was not in constructive possession of the claims by him, and he was not under his original location, and not included within the patents to the claims, for the same reason, as where he was constructively in possession of property not falling within the description of some monument or title held by him. *Butlerfield vs. Nogales Copper Co., Arizona.* 95 Pacific 152.

Sale of Mine; Broker's Commission.—A mining corporation was liable for the services of a broker employed by its manager and treasurer, where it received the price demanded for its property and executed conveyance with the presumed knowledge of the broker's services. This was said to be without the rule that a principal must accept of an agent's act inuring to his benefit in order to bind the principal. *Butlerfield vs. Ocala Mining Co., Oregon.* 94 Pacific 564.

Contract of Sale of Mine; Specific Performance.—A contract for the sale of a mining claim provided that the purchaser should furnish continuous employment to the seller at the mines at a specified rate per day beginning on a certain date, and terminating when the contract should terminate. The court refused to decree specific performance of the contract on the ground that there was a clear remedy at law in damages for its breach. *Mallory vs. Globe Boston Copper Mining Co., Arizona.* 94 Pacific 1116.

Contract for Sale of Mines and Minerals.—A contract provided that the vendor should sell by warranty deed free of incumbrance, the mineral and mining rights in certain lands, and that the vendee of the deed the vendee was permitted to remove the minerals and minerals thereon, on failure of the vendor to secure the release of a mortgage on the premises he agreed to lease to the vendee a mining claim to the purchaser for a specified term at a specific royalty per ton; the vendee was to pay the royalties and was to bind the deed, or to accept a lease as provided, and pay the royalties. This agreement was held to confer on the vendee an interest in the land itself, and that the contract was not a license revocable at the option of the vendor; and it was mutually binding on the parties and compelled the purchaser to operate mines on the premises in the event a mining claim was delivered, and that the contract was capable of specific enforcement. *Butlerfield vs. Ocala Mining Co., Oregon.* 94 Pacific 1116.

Breach of Contract; Substitute for Damages.—A contract for the sale of a mining claim provided that on compliance with any of its terms, the purchaser should forfeit all machinery and appliances placed on such claims, and that such forfeiture should be in full liquidation of all claims and damages for its breach. This was held to provide for the measure of damages for the breach of the contract, to the exclusion of a remedy by contribution of the contract, or of sale, or specific performance. *Mallory vs. Globe Boston Copper Mining Co., Arizona.* 94 Pacific 1116.

# Current Literature on Mining, Metallurgy, Etc.

**Development of Electric Mine Locomotive.** Frank C. Perkins. Describes the history and subsequent improvements in the mine locomotive, and gives a method of calculating haulage power and laying tracks.—*The Mining World*, July 4, 1908; pp. 4; illus.

**Tin Prospects in South Africa.** Critical resume of what is at present known of the tin resources of the subcontinent.—*So. Af. Mg. J.*, May 23, 1908; pp. 1%. 20 cents.

**The Brown Iron Ores of Alabama.** William B. Phillips. In his third article, the writer describes the geology of the Baker Hill deposit.—*Iron Age*, June 25, 1908; pp. 2; illus. 20 cents.

**The Correlation of International Strata.** Horace F. Evans. Continuation of a previous article, describing the work done by the Canadian Geological Survey.—*The Mining World*, July 4, 1908; 750 words.

**The Absorption and Accumulation of Gold on Copper Plates.** W. F. A. Thomas and Edward Haller. Discussion of authors papers by W. Fischer Wilkinson, and H. L. Whitaker.—*Bull. Inst. of Mg. & Met.*, June 11, 1908; pp. 4. 20 cents.

**Quicksilver Cathode for Electrolytic Work.** J. Stubbing. Describes the advantages of employing quicksilver as the cathode in the electrolytic cell.—*Electrochem. Zeit.*, May, 1908; pp. 2%; illus. (In German.) 60 cents.

**The Electrical Equipment of Gold Mines.** H. J. S. Heaheer. Reply of the author to the criticism of his paper.—*Bull. Inst. of Mg. & Met.*, June 11, 1908; pp. 20; illus. 20 cents.

**Separating Appliances.** Oskar Nagel. Describes the various forms of presses for separating solids from liquids; the processes of separation by crystallization, extraction and sublimation; separation by settling and freezing, and the mechanical separation of solids.—*Electrochem. & Met. Ind.*, July, 1908; pp. 3%; illus. 40 cents.

**Mining Coal in Big Stone Gap Field, Kentucky.** John P. Shippen. Rotary drums and coke drawing machines are successfully used. The coke ovens carry a flue which connects with the boilers. Gives analyses of the coal, and describes the system of ventilating and draining the mines.—*E. & M. J.*, June 27, 1908; pp. 3%; illus. 20 cents.

**The Application of Chlorine in Metallurgy.** Chas. E. Baker. Describes an economical chemical method of treating gold and other ores.—*Proc. Am. Electrochem. Soc.*, abstract in *The Mining World*, July 4, 1908; pp. 15.

**Metallurgical Calculations.** J. W. Richards. Discusses the condensation of zinc and mercury vapors and analyzes problems of practical interest.—*Electrochem. & Met. Ind.*, July, 1908; pp. 2%. 40 cents.

**Ores and Mines of Santa Eulalia, Mexico.** Claude T. Rice. There are several classes of ore at Santa Eulalia; those which contain much silver and little lead are accompanied by a silicious gangue;

those which contain much lead and a smaller amount of silver than the first class of ore, and are accompanied by a calcareous gangue; the lime ore that is simply an impregnation of the limestone by silver chloride and manganese oxide; the iron ore of the Mina Vieja; the mixed sulphides of the Potosi and the Santa Dominga; and the zinc ore of the Potosi.—*E. & M. J.*, June 27, 1908; pp. 4; illus. 20 cents.

**In ordering, give date of The Mining World in which the article has been mentioned. All orders are payable in advance.**

**The Cement Industry in the United States in 1907.** Edwin C. Eckel. Gives figures of production, raw materials used in the manufacture of Portland cement, the valuation of deposits of cement materials, kilns and kiln practice.—*Cement*, June, 1908; pp. 14. 40 cents.

**Cobalt, Ontario.** H. B. Smith. Describes the discovery of the district and the geology of the mines.—*M. & S. P.*, June 27, 1908; pp. 2%; illus. 20 cents.

**The Copper River District, Alaska.** Herman A. Keller. Describes the means of communication, geology and the more important mines.—*E. & M. J.*, June 27, 1908; pp. 5%; illus. 20 cents.

**Extracting Uranium and Vanadium.** H. Fleck, W. G. Haldine and E. L. White. This process has special reference to the treatment of carnotite.—*The Mining World*, July 4, 1908; 1,100 words.

**The Silver Refinery of the New Addition to the Karntan Copper Works.** Frank D. Easterbrooks. Describes the arrangement of the silver refinery, its equipment, and the method of operating.—*Electrochem. & Met. Ind.*, July, 1908; pp. 4; illus. 40 cents.

**Concrete for Foundations of Buildings and Machinery.** Henry Adams. It is generally considered that for heavy walls and foundation work the cement should be heavy and slow setting; but for floors it should be rather lighter and quicker setting. Gives the standard specifications for Portland cement, and describes the method of preparing concrete.—*Cement*, June, 1908; pp. 7; illus. 40 cents.

**Notes on Hand Stopping and Underground Management on the Rand.** J. A. Wickes. What is wanted in hand stopping is a clear idea (1) of how to modify your system of putting in holes to suit the conditions under which you are working; (2) how the shape of the face affects the working of the stope under different conditions. As regards the best system of placing the holes, there are three that the writer knows of: (1) benching; (2) zig-

zagging; (3) undercutting (or "resneing," as the Cornishman calls it). Describes the various methods of operation.—*London Mg. J.*, June 29, 1908; 2,500 words; illus. 40 cents.

**Costs and Profits in Silver-Lead Ore Production.** James Ralph Finlay. Reviews the factors that govern costs of mining, smelting and marketing, and makes comparisons of conditions in the Coeur d'Alene, Broken Hill and Park City.—*E. & M. J.*, June 27, 1908; pp. 3%. 20 cents.

**Cancas Concentration of Slimes.** W. E. Darrow. Discusses the various stages of the process.—*Mg. Sci.*, June 25, 1908; pp. 1%. 20 cents.

**The World's Copper Supplies in 1907.** John B. C. Kershaw. Discusses the relationship between the total world output of copper and the production of the United States; changes in the relative position of the eight leading copper producing countries during the period 1898-1907; and the variations in price for the past 25 years.—*Cassier's Mag.*, July, 1908; pp. 8; illus. 40 cents.

**Maryland's First Portland Cement Plant.** This plant, the property of the Maryland Portland Cement Co. at Security, Md., is nearing completion. Description of the construction and equipment of the different buildings, and of the quarry from which the raw material is obtained.—*Mfrs. Rec.*, June 18, 1908; pp. 2; illus. 20 cents.

**Colorado Fuel and Iron Co.'s Plant at Minequa, Colo.** Geo. J. Bancroft. Continuation of a previous article. Describes blast furnace practice.—*Mg. Sci.*, June 25, 1908; pp. 3%; illus. 20 cents.

**The Manufacture of Lithia from Lepidolite.** Wm. Jay Schieffelin and Thomas W. Cappon. Describes the method of separating the primary substances in the mineral.—*Jl. Soc. Chem. Ind.*, June 15, 1908; pp. 1%. 60 cents.

**Some Special Features of Practice at the Corocora Copper Mines, Bolivia.** G. Preumont. In the different levels and galleries no timbering whatever is employed, and it is replaced with success by walling and arching. Every block of stone used for arching is carefully dressed, cut, and shaped, according to vault building practice. Each block is 8 ins. to 9 ins. by 5 ins. or 6 ins. deep, and has its ends shaped to form the crown and extrados of the arch. The writer gives costs of building the arch.—*London Mg. J.*, June 20, 1908; 1,200 words; illus. 40 cents.

**Magnetic vs. Hydraulic Concentration of Tungsten Ores.** Harold H. Goe and Sidney W. French. First part of a prize thesis. Gives costs of a mill employing magnetic separation.—*Mg. Sci.*, June 25, 1908; pp. 1%; illus. 20 cents.

**The Illusiveness of Petroleum.** W. S. Eberman. Brief historical sketch of the petroleum industry, with suggestions to prospectors.—*The Mining World*, June 27, 1908; p. 1.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### A Friction Clutch for Hard Service.

The Cyclone Drill Co. of Orrville, Ohio, after having conducted a series of experiments covering a number of years, recently produced a clutch that handles the crank of a drilling machine entirely satisfactory. This clutch embodies all the features of a friction clutch, and in addition has a positive drive which works automatic, and only when the load is suddenly thrown on the friction and exceeds the carrying capacity of the friction sur-

face which is two to four times greater than the ordinary clutch.

to cause it to slip, the slippage can not equal more than 20% of one revolution, until receiving holes in the clutch cup register with the pins, at which time the pins spring in place, making a positive drive, preventing the clutch from again slipping until it has again been released.

The clutch is so constructed that when releasing it the positive drive pins are released and then the friction, it being impossible to release the friction before the pins are withdrawn, or to engage the pins before the friction is engaged, and carrying its full load.

It being operated by one lever and by one movement, this clutch meets the requirements for which it is designed and is



Fig. 1.

believed to be the first clutch to withstand the hard service to which it is subjected on a drilling machine crank.

It is also applicable for use as a single clutch on any piece of machinery when the load is irregular and momentarily excessive.

Fig. 2 shows the crank drawn back on the shaft, also the ends of the tool steel pins which make the clutch a positive drive.

The clutch is operated by one lever just as an ordinary friction clutch is operated; the friction starts the crank or gear carrying the entire load, and an

excess of 25% to 40% overload. When the full tension of the friction clutch is applied the shifting lever can then travel an additional distance compressing the two steel pins between the face of the cone and compression springs back of the pins. This sets the positive drive ready to operate automatically, and should the load on the clutch be such as

material or product beyond the economical capacity of teams or traction engines.

**Flexible Joint.** Barco Brass & Joint Co., 56 N. Jefferson street, Chicago. Pp. 16; illustrated.

Is devoted to a description and illustrations of the Barco flexible joint, which is made of but three metallic parts and

**Locomotive.** Heisler Locomotive Works, Erie, Pa. Catalog 106. Pp. 36, illustrated.

A complete and detailed description is given of the Heisler locomotives which are especially recommended by the makers for short haul requirements over steep grades, sharp curves or uneven track, or light rails and bridges, which are so common to tracks built in getting out timber, mining and other industries requiring considerable haulage of



Fig. 2.

has two hard non-metallic gaskets which prevent the contact of metal to metal at any point. This prevents the ball from grinding itself in spots and the joint from becoming leaky.

**Shortwall Coal Cutter.** The Jeffrey Mfg. Co., Columbus, O. Bulletin 14. Pp. 12; illustrated.

In this pamphlet, which is attractively printed, is given a general idea of the Jeffrey 26-B "Shortwall" coal cutter, its method of operation, and the points of excellence claimed for it. In addition to the above the Jeffrey electric breast coal mining machines are illustrated.

**Stamp Milling Machinery.** Colorado Iron Works Co., Denver, Colo. Catalog No. 6 C. Pp. 71; illustrated.

Illustrations and descriptions of machinery are presented made by the company for use in the treatment of ores by stamp milling and amalgamation. Several pages are devoted to a description of the stamp amalgamation process and much other information of value is given. The publication is copyrighted but will be sent free to readers of The Mining World interested in the subject.

**Steam and Electric Power Shovels.** The Vulcan Iron Works Co., Toledo, Ohio. Pp. 119; illustrated.

In this catalog is shown the general construction of Vulcan shovels and the manner in which they perform the various kinds of work for which they are built. Numerous half-tone reproductions from photographs show the varied purposes for which the Vulcan shovels are used. The catalog is attractively printed and serviceably bound.

**Air Hammer Rock Drills.** The C. T. Carnahan Mfg. Co., Denver, Colo. Pp. 42; illustrated.

This is the latest of the company's publications and is devoted to a description and illustration of the Murphy air hammer rock drills and accessories, embracing in their design and application the Carnahan system of breaking rock. The points of excellence of the equipment are presented and full instructions are given relative to ordering, care and operation.

**Pulp Rolls.** The Calkins Co., 348 Main street, Los Angeles, Cal. Folder; illustrated.

Describes the Advance pulp rolls, manufactured only by the Calkins Co., and which are especially designed for grinding ore samples to any given fineness of mesh, without the formation of any impalpable product. These rolls take the ordinarily coarsely crushed product of a rock breaker, are geared and may be operated by hand or power.

**Self-Oiling Mine Railway Wheels.** Lobdell Car Wheel Co., Wilmington, Delaware. Pp. 24; illustrated.

Illustrates and describes the latest improved model of the Faught patent closed hub self-oiling wheel, which is designed to meet the severe requirements of mine railway and other similar service. These wheels are made of all diameters and weights, suited for every variety of service. A list of users is given and copies of letters commendatory of this equipment are reproduced.

## Industrial Notes.

The Colorado Machinery & Supply Co., recently incorporated, will shortly begin the erection of a new building at 1648 to 1652 Wazee street, Denver, Colo. R. M. Farrar, formerly with Morse Bros' Machinery Co., is secretary and treasurer of the company.

The Wellman-Seaver-Morgan Engineering Co., Cleveland, O., reports much improvement in inquiries for ore and coal handling machinery, both from western mines and from Pennsylvania coal mines. Inquiries are coming from large concerns that have been purchasing no equipment for several months past, and the company expects soon to begin work on some good orders.

The Bird-Archer Co., manufacturers of Bird-Archer boiler compounds, has appointed the following new representatives: Chicago, Golden Rule Oil Co., 171 Washington street; Baltimore, Maryland, Railway & Electric Supply Co., 604 Continental building. The Philadelphia office of the company has been moved from 56 North Delaware avenue to 119 South Fourth street.

The following officers of the Crocker-Wheeler Co., manufacturers and electrical engineers, of Amperes, N. J., were elected July 10: President, S. S. Wheeler; vice-president, Gano Dunn; second vice-president, A. L. Doremus; chief engineer, Gano Dunn; secretary, Rodman Gilder; treasurer, W. L. Brownell; assistant secretary, J. B. Milliken; assistant treasurer, G. W. Bower.

The United States Metal Recovery Co., which is erecting a plant near Elwood City, Pa., for extracting metals from various ores, recently completed one of its snail buildings. Motor crushing, elevating and separating machinery is being installed, and this department will be placed in operation about July 10. Another building, which is nearing completion, will be used for manufacturing manuels used in gas lighting, the by-product from certain minerals being utilized in their manufacture. R. Daas, House building, Pittsburg, has charge of the engineering work.

Labor saving devices are constantly being discovered, and one of the important ones has been the development of a new type of roofing which does not require continual painting to keep it tight. Amatite roofing has a surface of real mineral matter. The pitch in which this mineral is imbedded is so adhesive that the mineral surface will not wash off. After an Amatite roof is laid there is nothing more to do to it. It is not necessary to look after it each year for painting or patching, and all the labor and cost of coating the roof is done away with. The manufacturers of Amatite are glad to show samples of their materials, and these may be obtained by a postal card request addressed to the nearest office of the Barrett Manufacturing Co., New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans.

## Personal.

H. P. Lefevre of New York city is on a professional visit to Central America.

O. Weichser of El Paso, Texas, recently inspected properties in Oaxaca, Mexico.

J. Parke Channing has completed an inspection of a number of milling plants in Utah.

E. A. Drake has accepted the presidency of the New Mexico School of Mines at Socorro, N. M.

E. P. Earle has returned to New York city from Cobalt, Ont., where he has been on business.

J. M. Porter of Spokane, Wash., has been examining properties in the Coeur d'Alene district, Idaho.

J. P. Hutchins of New York city is in British Columbia, where he will spend some time on professional business.

W. H. Yeandle has been appointed superintendent of the Rosario mine in the Taviache district, Oaxaca, Mexico.

Charles Thomas of the La Mina las Arenas mine, Sahuaripa, Sonora, Mexico, was in Chicago several days last week.

S. P. Jellum of Spokane, Wash., is making mine examinations in the Elk City district, Idaho, for eastern clients.

Harrison Souder, superintendent of the Cornwall Ore Bank Co., Cornwall, Pa., is visiting the iron ranges of Minnesota.

H. W. Benton has succeeded to the management of the properties of the American Mining & Milling Co. in Mexico.

L. C. Jaquish of Spokane, Wash., has been appointed manager for the Mineral Farm Mining Co., with property near Mullan, Idaho.

R. S. Moss, chemical consulting engineer, has moved his offices from the Masonic Temple to rooms 738-9 Unity building, Chicago.

F. R. Hazenwood has resigned as superintendent of the Rosario mine, Taviache, Mex., and has accepted a similar position at El Oro, Mex.

Benedict Crowell of the firm of Crowell & Murray, Cleveland, Ohio, is at present in Mexico, making an examination of mining properties for eastern clients.

William R. Chedsey of Denver, Colo., has accepted a professorship in the mining department of the University of Idaho, and will assume his duties in September.

A Bement has opened an office in the Fisher building, Chicago, as consulting mechanical engineer. He recently resigned from the smoke commission of the city of Chicago.

Henry Lancaster, mining engineer of Wallace, Idaho, has completed an examination of mining properties in the Coeur d'Alene district, Idaho, for Washington clients.

John G. Kirchen has succeeded Bryce W. Turner, resigned, as manager of the

Montgomery Shoshone Cons. Co., Goldfield, Nev. Mr. Kirchen will retain the management of the Tonopah Extension Co. Mr. Turner, it is understood, has accepted a similar position in Mexico.

Dr. Robert E. Richards is on a professional visit in the west. Before returning to Boston, about the middle of August, he will visit Arizona, Utah, Montana, Idaho and Colorado.

C. A. Spalding, general manager of the Monarch mine at Murray, Idaho, and vice-president and general manager of the Idaho Northern railroad, was in Spokane, Wash., last week.

Henry Hamberg, president of the Princeton Copper Mining & Smelting Co., has returned to the company's properties in the Huachuca mountains, Arizona, from a visit to Pittsburg, Pa.

A. H. Kidney, mining engineer, of Denver and New York, is at Cobalt, Ont., and will visit other Canadian mining sections before returning to New York. Mr. Kidney is interested in the Behrend concentrator.

C. M. H. Sansome, mining engineer, formerly manager of the Gold Finch mine, and connected with the Granby Co. and the Anglo-American Hydraulic Co. in British Columbia, has opened an office at 14 Whittier block, Spokane, Wash.

## Technical Schools and Societies.

**Colorado School of Mines.**—The Vinson-Wash fund has been established by the trustees, to be used to maintain a bureau of original research. The occurrence of rare minerals and metals in Colorado, their uses and possibilities, will be the first work of the bureau. Dr. Herman Fleck, professor of chemistry, will be in charge of the work. He will be assisted by Sydney W. French.

**University of Arkansas.**—The department of mining and geology will next fall offer a four-years' course for the degree of "bachelor of science in cement engineering." Besides the general engineering, geology, etc., special work extending over two years will be given in the geology, occurrence, examination and testing of cement materials and in designing and operation of cement plants. Besides the nearness of the well equipped plants in the Kansas gas district the university is especially well situated for this work, since in the immediate vicinity of Fayetteville, at which the university is located, are several well exposed outcrops of limestone and shale, suitable for making portland cement. At least two months' actual work at a cement plant will also be required before the degree is granted.

On Seward Peninsula, Alaska, spur benches differ from the gravel terraces in that the stream bed is entrenched in the bed rock below the gravel deposit; and where, as is usually the case, the stream meandered over the valley floor at the old level these meanders have been cut down into the bed rock, leaving the spaces between meanders projecting from the valley walls as flat topped spurs.

# Late News From The World's Mining Camps.

## ALASKA.

Juneau.

Shipments of gold from Alaska to the states to an amount exceeding \$5,000,000 were made during June, which is the largest monthly record of Alaska gold shipments yet made.

According to reports from Vancouver a party of French capitalists interested in the syndicate that obtained hydraulic mining concessions in the Klondike last year and experts are on their way to inspect the property to determine steps for development.

Considerable interest has been centered on the Juneau district since the sale of the Ebener property and some prominent mining men are on their way to visit the district. The mineral belt is 130 miles long along Stephens passage, Chilcat channels and Lynn canal. The ore, although of low grade, occurs in large bodies. The De Groff property on Chiklagoff island has produced nearly \$100,000 and has paid for all improvements. A force of men is now at work driving a crosscut tunnel and taking out ore from another tunnel on the vein. About 500 ft. of tunnel work has already been done. Another and larger mill will be built as soon as the new tunnel cuts the ledge.

Active development is going on on a number of other properties on the island. The ore is a free-milling gold quartz of high grade.

The Beatson copper mine on Latonche island, about 90 miles southeast of Valdez, owned by Andrew K. Beatson and others, is reported to have \$10,000,000 worth of ore in sight. The ore body, of unknown size, is blocked out in two directions by tunnels, no shafts being used. The richest ore, from 7 to 10%, is shipped to the smelter at Tacoma, Wash. The output through the smelter for 1907 was 1,020,000 lbs. of copper and 9,000 ozs of silver. Only about 30 men are employed and the output is purposely restricted on account of the high transportation and treatment charges. A tram road over which the loaded cars are carried by gravity connects the mine with the dock.

A large number of prospectors recently left Juneau to follow up a reported rich find of copper reported somewhere between Cape Fairshaw and Lituya bay.

The Alaska road commission has made allotments for the present season amounting to \$400,000, of which \$110,000 is to be spent to widen the main winter trail from Valdez to the interior and to cut a road in the mountain side on Big Delta river. This and the connection of many new mining camps with the rivers will be a great aid to mining in the interior.

## ARIZONA.

Bisbee.

The most important strike in the district during the past few months was made at the Junction shaft of the Superior & Pittsburg Co. this week when sulphide ore was encountered on the 1,200-ft. level. The new strike was made

## BY STAFF CORRESPONDENTS.

in No. 17 drift running in an easterly direction from the shaft and about 550 ft. from the station. The whole face of the drift is still in ore, having gone through 17 ft. up to the present time. The ore runs on an average, 8% copper, although some runs as high as 35% and as low as 2%. Another strike of importance was also made this week in crosscuts Nos. 14 and 16 on the same level and drift. Crosscut No. 14 at a distance of 200 ft. from the strike in the drift has penetrated ore for 25 ft. and still has a full breast of ore also assaying 8%. In crosscut 16, the part of the former crosscut on the other side of the drift, low-grade sulphides have also been encountered. It is believed that an immense ore body has been encountered. The shaft has passed the 1,500-ft. mark and the 1,200-ft. station will soon be commenced and drifts extended in various directions from the shaft.

The Junction is the deepest mine in the Warren district and most of its commercial ore is in its lowest levels, improving with depth, and it is believed that the shaft will yet be sunk to a depth of 2,000 ft. At present preparations are under way to increase the shipments from one to two cars (100 tons) daily.

A greater amount of water is handled at the Junction than at any other property in the district, the surrounding territory for some distance being practically drained through it.

At the Hoatson shaft of the same company shipments continue daily to the Calumet & Arizona smelter at Douglas, an average of seven cars being sent every day in the week.

Shipments averaging six cars daily are being maintained from the Cole, or L. S. & P. shaft of the company.

The Calumet & Arizona Co. is operating along the same lines as during the past five months, the average shipments from its Irish Mag and Oliver shafts running 20 cars daily. But little new work being done at present.

The Copper Queen's Lowell shaft has passed the 1,400-ft. level, at which place a station has been begun.

The Shattuck-Arizona Co. is pushing development and exploration work with satisfactory results. Considerable new ore has been encountered in the south drift on the 100-ft. level.

The property of the Princeton Mining & Smelting Co. in the Huachuca mountains will remain idle until September. Money has been raised in Pittsburgh for carrying on development work. Henry Hamberg is president and manager of the company.

## CALIFORNIA.

Sierra City.

At the Sierra Buttes mines 90 men are working and the 40-stamp mill is running at full capacity. In the lower workings considerable ore of excellent grade

has been developed with systematic explorations constantly adding areas of productive territory to the proven mineral zone. During the present season several important improvements are planned that will greatly facilitate the profitable operation of the mines. The Hayes brothers of San Jose are the principal owners of the property although many eastern people are interested. E. J. Olsen is superintendent.

The Poker Flat Gold Gravel Mining Co. is making good progress in opening its property. This property is located in the Poker Flat basin which has produced several million dollars from its surface gravels. It is expected that the deep gravels will yield equally well if not better.

The Grizzly Cons. group, located between Grizzly and Poker Flat has been bonded for a year to a strong company of California men. Tests of the ore are being made and machinery will be installed as soon as conditions permit. The Grizzly Cons. has produced considerable ore of excellent grade. F. P. Roddy is general manager.

The Forrest City Mining Co. is actively pushing work on the adit at the Nabel Mertz mine and expects to encounter the gravel channel within 30 days. Two shifts are employed. As soon as the channel has been cut, crosscutting will be commenced and the working force largely increased. The channel for which the company is driving has been one of the richest producers in the country and is expected to yield well when intersected by the new tunnel.

A prospecting syndicate composed of A. J. Chandler, C. H. Brown and Ole Peterson is actively exploring the serpentine belt lying between the Middle and North forks of the Yuba river. Exhaustive tests of the mineralized deposits have been made with encouraging results. Several claims have been located and those interested expect to commence work at several points within the near future.

Several other prospecting outfits are actively engaged in the Forrest-Alleghany districts and hundreds of promising claims have been located during the past three months. Eastern people are interested in several of the ventures.

A part of the working force of the Young America mine has been transferred to the Tom Boy quartz property, which is being developed on a comprehensive scale. The ledge is 6 ft. wide with a 6-in. pay streak in the footwall. The remainder of the vein is heavily mineralized and carries fair values. At the Young America the rich gravel channel is being extensively opened up. The property is in excellent shape.

Sonora.

The Chattanooga, Tenn., company, which recently acquired the Riverside mine near this place is actively pushing the work of development on the property. The old tunnels have been cleaned up and re-timbered and a large amount of new



country opened up. Several bodies of high-grade ore have been proven in the new workings while an immense reserve of low-grade ore is ready for treatment. The 10-stamp mill is being overhauled and arrangements are being made for the early installation of 20 additional stamps. A modern cyanide plant will also be installed soon. With the Riverside is connected the Summit and other mines. In the past the property produced extensively and with the completion of the improvements now under way it will undoubtedly recover its former prestige. J. D. Beggs is president and local manager of the company.

At the Oakland mine, four miles north-east of Columbia, the shaft has attained a depth of 120 ft. with east and west drifts driving. An 800 ft. tunnel is being driven to open up large reserves of ore near the surface. Two stops are also being run. The mill is operating at full blast. Chas. Harry is superintendent. The mining outlook around Columbia is excellent.

Fifty stamps are dropping at the Harvard mill and a large force of men is busy developing and extracting ore. The ledge is showing well and the management is well pleased with conditions. The Omega mill is practically completed. The tramway from the mine to the plant is finished and works well. Considerable work is going forward in the Omega mine with good ore reserves opened up.

A rich strike is reported from the lower workings of the famous Utica mine at Angels. This mine is working a high force of men and keeping the mill running day and night.

A high-grade deposit of ochre has been discovered in the Juniper mine by Colonel Robinson. The deposit is conveniently located for cheap development and exploitation and will immediately receive attention. The Juniper is owned by the Mokelumne Hill Mining & Milling Co.

The tramway for the transportation of supplies from Martell to the Kennedy mine has been placed in operation and is working satisfactorily. The freight is drawn by mules to the summit and thence to the mine by gravity. An engine at the summit draws up the empty cars. Extensive developments continue in the mine. Greenville.

The Indian Valley Mining Co., E. J. Franz, manager, has secured the Summit quartz mine and will open it up in connection with the Indian Valley. The Summit is believed to contain the extension of the Magna Charta pay sheet.

## COLORADO.

Denver.

The Keystone mine, owned by C. L. Waterman, at the junction of Blue river and French creek in Summit county, is reported to be developing into a promising property. One tunnel is in 190 ft. on the French creek side of the hill and another 150 ft. on the Blue river side. The ore is a quartz-porphry said to be very rich in free gold. There is also considerable cyaniding ore. A 50-ton cyanide mill is to be built in the near future to treat the dump.

Excellent progress is being made in

driving the drainage tunnel into Bryan mountain, Boulder county, on the property of the Highland Mary Co. The tunnel will drain the Highland Mary property and probably the Revenge as well.

The work of remodeling the Kemp mill in the Boulder district is progressing satisfactorily. The cyanide process will be used and all grades of ore treated with special attention to the low-grade. The mill will have a capacity of 100 tons per day.

The dump at the Lamartine tunnel at Idaho Springs has been leased by John G. Roberts and machinery is being installed for concentrating the ore. As the tunnel was run on the vein and no attempt was made to save the ore the dump contains some high-grade material.

A report of ore shipments from Idaho Springs for June over the Colorado & Southern railroad shows a total of 165 cars sent out as against 117 for June, 1907, or an increase of nearly 43%. In the same month this year 76 cars were received while in June, 1907, but 67 cars were received, a gain of nearly 14%.

The geological survey of the Breckenridge gold fields, recently authorized by the department of interior, is being started by a topographical corps under the direction of Charles E. Cooke. It is the intention of this corps to cover a section roughly extending five and one-half miles east of Breckenridge, one mile west, five miles north and two miles south, which will cover the district containing most of the lode mines and one of the largest placer districts in Colorado.

The ores on the Star of the West property on Iron hill in the Leadville district have steadily increased in richness until they now carry high-grade silver values. The ore body is widening out and it is expected that the working force can soon be increased to several times its present size. Steady shipments will be maintained and probably greatly increased in the near future.

Satisfactory development work has been done on the Louise property in South Evans gulch under lease to Otto Thurn and associates. During the last six weeks a shaft has been sunk a short distance and considerable drifting done.

The installation of the new boiler and engine on the surface plant at the Huckleberry shaft in the St. Kelvin district, under lease to Thomas Owens and associates, has been completed and the work of unwatering the mine will be proceeded with. A streak of ore has been encountered in the bottom of the shaft, but while operations were suspended it was covered over with water, and it is the purpose to completely drain the property and continue with its further development.

Preparations are being made for some extensive improvements on the Little Willie property also in the St. Kelvin district. New machinery will soon be installed for handling both water and ore and, as soon as the plant is ready, extensive developments will be started.

Needleton.

The inauguration of development work

on the Whiton estate of about 50 patented claims after an illness of 20 years has given new life to this camp and more activity is shown than for a number of years. A force of men is at work on the Aztec and Mt. Aedon groups under the superintendency of J. Moore on a large number of claims. The force will be increased and shipments made as soon as possible.

A small force of men under the management of E. H. Blunt is at work on the Waterfall group. The force will be increased for the winter's work.

The Pandyx 1 and 2, the Cleveland 1 and 2, and Sun Row claims are being developed by C. A. Burt, a partner of Senator Monroe of Oregon.

A deal is about closed for the sale of the Sheridan, Anacora, Buster Brown, North Western and Good Luck claims owned by A. A. Steward and others of Coffeyville, Kansas. Wide seams of sylvanite ore were recently encountered in the tunnel giving indication of more than a pocketly formation.

The company that bought the Bullion Mountain group of six claims is now being re-organized by Manager W. L. McGregor and preparations are being made for continuous development and shipping. A tunnel is in 1,400 ft. on the Aetna claim and has cut a number of new veins.

A group of six claims owned by Philip Dentinger and J. E. Reitel of Cedar, is now being developed and there is a large body of pay ore in one shaft.

A group of eight claims will be fully developed by John Bloom, part owner. Supplies have been ordered and a force will soon be put to work. Many tons of good concentrating ore are now on the dumps.

## Cripple Creek.

Shipments from this camp have lately shown a marked increase and there is a strong demand for ore cars and teams. The output for the present month, it is thought, will be about one and one-half million dollars.

During June about 1,600 tons of \$10 ore was shipped from Stratton's Independence. All of the 21 sets of leasers on the property are in ore and are making regular shipments. The cave-in on the surface, from which Pherson brothers are breaking ore disclosed a large vein carrying values of from 4 to 6 ozs. gold to the ton. A shipment of two cars of this ore has been made. A leaser on the 300 level has opened a vein from 6 to 8 ft. wide, shipments from which are returning from \$30 to \$10 to the ton.

Richard Blanchard, who has a lease on the Hiawatha property on the west slope of Beacon hill, has just made a shipment of ore to the mill. This is the first shipment from this property in some time. The shipment will probably run about 1 1/2 to the ton.

Considerable development is being done by Johnson & Co. on the South Clara D., and another shipment has been made from the vein on the 350 level of ore carrying sylvanite and rusty gold.

The Beacon Hill Development Co., lessees of the property of the Gold Dollar Mining Co., are developing the large-

ore body opened on the property during the last year. A flat vein between two vertical veins has been cut, the ore body averaging 70 ft. in width. The company has crosscut the entire width of the shoot and has also drifted on it for a distance of over 150 ft. The vein has an average thickness of 5 ft. and carries from 1 to 4 ozs. of gold to the ton. No attempt has been made at large production because of lack of room, but a big tonnage will be maintained this month. In June 22 cars of \$50 ore were shipped. The screenings and coarse rock runs respectively \$10 and \$25 to the ton. There is over 300 tons broken in the stope.

Hosner, Davis & Caro, operating on the Wild Horse on Bull hill, have cut an ore body on the 600 level of the old shaft. There are two parallel veins. A shipment from this strike is being prepared.

Allen and Berkshire, lessees on the Australia claim of the El Paso property on Beacon hill, have opened an ore body on the third level 6 ft. between walls. The ore is quartz containing sylvanite as saying from 1 to 28 ozs. gold to the ton. Regular shipments are being made.

## IDAHO.

### Wallace

It is understood here that the Snow-storm Co. will declare a 3% dividend this month, this being a postponed dividend due for distribution last month, but held over until a larger percentage could be declared. The mine is now working steadily and shipping ore to several smelters.

It is reported from the Arctic group on Placer creek that the miners have broken into the vein where they were met by a heavy flow of water that drove them out. The mine has a good showing and work has been in progress for several months.

The Imperial Mining Co. will start a 2,700-ft. crosscut tunnel within a short time which will tap the ledge at 1,100 ft. The lowest working yet reached is 400 ft. and has opened up carbonates carrying lead and silver values. The cost of the new tunnel is estimated at \$30,000.

Silver ore has been encountered in the Silver Eagle mine in a drift now being tun at a depth of 225 ft. The property is opened by this drift and several crosscuts to the walls. It has been determined that the vein is 50 ft. wide and that at one point at least the commercial ore measures 8 ft. in width. The property consists of eight claims on four of which the outcroppings have been traced.

It is announced that ore shipments will be begun at the Monarch mine, near Murray, late this fall. A large reserve is now ready in the stope awaiting the coming of the Idaho Northern railroad to a convenient point in the district. The mine is equipped with air compressor and a 100-ton mill which has turned out \$50,000 of ore in the past for wagon freighting to the railway. It is stated that an increased force of men will be put to work August 1 upraising from the No. 3 level, which will open the upper workings for economic discharge of the ore at railway grade.

Leasers have begun work on the Min-

eral Point property near Osburn, and will begin shipping sometime this month or early in August. The property is said to carry its values in gray copper rich in silver. It has been a shipper in the past, but is not extensively developed as yet. Its showings are considered good.

Work is progressing steadily on the Chicago-London property near Murray, where it is expected there will be enough ore to begin shipping as soon as the new road is completed. Recently an ore shoot 150 ft. long was struck which carried large values in zinc and lead. The mine is well equipped with all necessary machinery and is employing about 20 men at present.

### Mullan.

The Hunter mine, owned by Messrs. Hemmery and Keely of Chicago and Dennis Ryan, is again operating at full capacity under the management of Mr. Ryan. Patrick McElmeel is the mine fireman under whose direction the underground development is being done. The Hunter tunnel, which is 3,900 ft. long, crossed four veins of lead-silver ore, any one of which is of sufficient importance to make a producing mine. Two of these veins are on the American-Commander ground. The other two are on the Hunter ground and are known as the North and South veins. Both of these are being worked. Stopes on the South vein show a width of 50 ft., all of which is milling ore. The company has no connections with the old workings at the present time, but is preparing to connect with them with a diamond drill, making a 3-in. core. Preparations are being made to sink a winze on the vein and the station for this purpose is under construction. The company recently put in on trial two Chicago Giant drills made by the Chicago Pneumatic Tool Co., Chicago. These machines are handled by the Hallidie Machinery Co. of Spokane and are giving the best of satisfaction wherever operated in this district.

The long tunnel on the American-Commander property is now in a distance of 808 ft. and the company will let a contract for an additional 50 ft. in a short time. The tunnel so far completed was driven under contract by Edward Lindsay, who will probably have the new work.

The Imperial Co. west of the Copper King has plans perfected for the driving of a new tunnel which will be 2,700 ft. long when completed and will open the vein at a depth of 1,100 ft. The new tunnel will start in Sawmill gulch above Burke.

The new tunnel at the Reindeer is now in a distance of 750 ft.

The Copper Queen Mining Co. is having a survey made of the property by Henry M. Lancaster of Wallace. The survey includes a line for a new tunnel which will be about 1,800 ft. long. The company has made no definite plans for driving this tunnel, but Manager E. B. Crawford says the property will be opened on a deeper level, either by means of this new tunnel, or through the Reindeer tunnel. The Reindeer is on the same vein and will open the ledge near the Copper Queen end lines.

The Star Mining Co., under the man-

agement of E. H. Moffett of Wallace, continues to drift in a large body of galena ore. There is said to be enough ore in sight now to place the valuation of the mine at \$1,000,000. Two years ago the property was merely a prospect with little or no surface showing.

The preparatory work at the Copper King mine for the starting of the long tunnel is well under way, and the company expects to have everything in readiness for actual tunnel driving within 60 days.

## LAKE SUPERIOR.

### COPPER.

#### Houghton, Mich.

The two shafts just started by the Ahmeek are planned on much the same lines as the two shafts of the Centennial, which are but 90 ft. from center to center, at surface, but spread, fanwise, as they descend. The Ahmeek shafts also resemble those at the Allouez in that they leave surface at the angle of 80°, but will take the angle of the ledge when that is encountered at depth, a curve of several hundred feet connecting the two tangents.

The Centennial Co., now controlled by the Calumet & Hecla, has two old mines as well as the present mine opened on the Kearsarge bed. The Centennial Co., originally the Schoolcraft, opened a deep mine on the Calumet conglomerate on its lands lying next north of the Calumet & Hecla, but could not make the mine profitable despite efforts continued for 15 years. What proved worthless to the Centennial when it stood alone may be of value to the property under the control of the Calumet & Hecla, for the latter has facilities for economical extraction and milling that the Centennial lacked. Mining and milling costs are materially less than 20 years ago, and rock of so low a grade as to have been worthless in 1888 is now being extracted and stamped at a good profit, even though the finished product is cheaper now than then. Then, rock carrying less than 20 lbs. of copper to the ton could not be made to yield a profit. At present only a few of the amygdaloid mines of the district are treating rock that averages as much as 20 lbs. of finished copper to the ton of rock stamped, yet the Quincy, Mohawk and others are paying large dividends from rock yielding only 17 to 18 lbs. of fine copper to the ton. The Centennial also has a mine nearly a quarter mile deep on the Osceola amygdaloid, apparently of about the same grade as the five Osceola shafts of the Calumet & Hecla, near south, which are producing nearly 2,000 tons of stamp-rock daily.

### IRON.

#### Marquette, Mich.

While ore shipments have gradually been enlarging the past few weeks, the movement is disappointing. With less than 3,000,000 tons sent out up to the first of the present month there is already a loss of approximately 10,000,000 tons compared with the amount forwarded last season. With almost five months of navi-

gation remaining, there is yet time to make a good record; but it is very much doubted if shipments the last half of the season will be as great as was expected.

There has been no reduction of wages and because the bulk of the surplus labor has returned to Europe there are comparatively few idle men. Practically as much new work is being done at the mines as ever and local trade is holding up remarkably well.

The Steel Corporation having practically completed its program of stripping at the Norman-Ohio property at Virginia, Mesabi range, preparations are being made for the extensive mining of the tract. The Norman was formerly a milling proposition, but a portion of the tract has now been transformed into an open pit for steam-shovel mining. The work has taken one and one-half years' time. Approximately 1,000,000 cu. yds. of overburden averaging 35 ft. in thickness has been removed. It has been found impracticable to strip the entire tract, and in this portion the ore, which lies under a heavy capping of rock, will be mined by the underground and milling system. The product will be taken out through two shafts. These shafts will be equipped with steel head frames, the erection of which is in progress, as is the installation of the power plants. From 1893 until 1908 the Norman produced 400,000 tons.

An important stripping work is to be carried on along the formation extending across the Steel Corporation's Clark and Chisholm properties now mined by the underground system, northwest from the Monroe-Tenney to the Leonard pit. The task will require several years' time. The contractors, the Drake, & Stratton Co., have a number of shovels in commission at the Steel Corporation's Leonard property, where the open-cut work is being enlarged.

The ore having all been taken out, the Republic Iron & Steel Co. has abandoned its Alexandria pit, a member of the so-called Keewatin group, and lying west of the Stevenson. The deposit was a small one, comprising less than a quarter of a million tons, and it has required only two full seasons to mine it.

The Adriatic mine, an underground proposition two miles west of Mesabi station, has lately increased forces and is shipping. The property is controlled by Pickands, Mather & Co. and Joseph Sellwood.

Mining engineers representing the Cleveland Cliffs Iron Co. have been looking over properties in the Iron River district, at the western end of the Menominee range, and it is the expectation that a number of promising tracts in that field will shortly be taken over by the big concern. Aside from the Crosby mine, on the Mesabi, the company has heretofore confined itself to the Marquette and Gogebic ranges. It has the big Ashland, in the latter district, and on the Marquette it has a greater number and better mines than any other operator.

The Florence Iron Co., which is a subsidiary of the Industrial Securities Corporation of New York, is exploring the Hall property, in the Iron River field, and with excellent prospects of developing a mine. Ore has been cut.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week of July 11 and the year to date were as below in pounds:

LEAD ORE SHIPMENT.			
Camps.	Week, July 11.	Jan 1, July 11.	
Alba-Neck City .....	78,250	180,810	
Aurora .....	186,750	186,750	
Badger-Peacock .....	34,000	774,280	
Carl Junction .....	127,570	127,570	
Carroll .....	11,250	11,250	
Duane .....	48,010	2,208,470	
Galena .....	89,883	5,605,453	
Granby .....	25,100	846,000	
Joplin .....	402,299	7,842,459	
Miami .....	81,350	683,840	
Oronogo .....	.....	338,180	
Peoria .....	.....	1,930	
Prosperity .....	51,610	2,102,910	
Quincy .....	51,600	638,070	
Seneca .....	.....	152,740	
Springfield .....	.....	27,020	
Sturgis-Spring City .....	22,660	577,060	
Webb City-Carierville .....	978,870	29,015,080	
Zincite-Sherwood .....	.....	127,760	
Total, lbs. ....	1,882,352	40,800,012	
Value .....	\$46,272	\$1,093,844	
Total, 1907, lbs. ....	1,298,510	52,185,220	
Value .....	\$36,774	\$2,069,322	

ZINC ORE SHIPMENT.			
Camps.	Week, July 11.	Jan 1, July 11.	
Alba-Neck City .....	416,250	12,897,660	
Aurora .....	.....	8,960,270	
Badger-Peacock .....	129,190	12,908,180	
Carl Junction .....	78,400	946,720	
Carthage .....	214,290	3,975,560	
Cave Springs .....	16,810	890,730	
Duane .....	411,780	16,411,390	
Galena .....	635,300	19,792,550	
Granby .....	127,900	1,256,260	
Joplin .....	2,515,720	59,641,570	
Miami .....	171,518	2,149,500	
Oronogo .....	.....	411,660	
Prosperity .....	142,000	7,840,490	
Quincy-Haxby .....	.....	27,290,210	
Seneca .....	.....	163,950	
Saxeville .....	54,600	2,291,010	
Sturgis .....	.....	26,600	
Sturgis-Spring City .....	112,150	5,823,800	
Stout City .....	.....	62,230	
Webb City-Carierville .....	2,567,968	70,425,720	
Wentworth .....	.....	17,020	
Zincite-Sherwood .....	114,730	1,722,190	
Total, lbs. ....	8,737,796	256,546,818	
Value .....	\$128,392	\$4,339,022	
Total, 1907, lbs. ....	13,935,060	337,961,120	
Value .....	\$313,372	\$7,902,240	

### Webb City, Mo.

There is little change in the ore market this week. The production will be somewhat less than usual owing partly to the delay in starting the mills after the lay off July 4 and partly to the fact that a few more mills have shut down, including the Gibson Girl and Electrical Incline at Porto Rico. It is reported, however, that two plants will reopen at once and that two new producers are about ready for operation in the Webb City camp, which will offset the closing of the above two mills. While all over the district properties are closing indefinitely, a considerable number are being reopened so that the production is about equalized.

A contract has just been let for the erection of a 300-ton mill on the lease of Coahulla & Co. at Porto Rico. The mill is to be located on a 40-acre lease of the Horton land adjoining the Church-Mitchell. Drill holes have located ore at 200 ft. A double compartment shaft is being sunk in which the skip system will be used.

The Newshy on the old Boston-Duane tract will resume operations after a long shut down. This is an old producer, formerly worked at the 140-ft. level, but the present work will be done at 180 ft.

When the work is sufficiently advanced a mill is to be built.

The old Prudential mine has just been leased to the Endeavor Mining Co. and the new mill is almost completed. The plant will handle 250 tons per shift. One shaft reaches the 215-ft. level and a second one is being sunk near the mill.

A rich strike of zinc ore was made on the Reliance tract south of Webb City formerly called the Baker ground. A shaft has been sunk and with a little more development the lease will be ready for a mill.

A new sheet-ground mill on the Brazos Co.'s ground north of Webb City has been added to the producing list. The plant has been completed for some time, but owing to necessary delays was just put in operation this week. Development work is not completed though two shafts are into the ore body at 170 ft.

### Carthage, Mo.

Work is now progressing rapidly upon the Porter tract in the northwestern part of Carthage. A derrick has been erected and large pumps installed, which are lowering the water at the rate of 2 ft. per hour. The shaft is 160 ft. deep and it is thought that the water will be entirely drained by next week so that a force of men can be put to work in the ground. This tract was worked about 15 years ago when it was one of the richest camps in the district. The tract was released last winter and some rich deposits were found by drilling. A number of companies are preparing to do active work in this vicinity at once and many of the old shafts are being cleaned out and made ready for operation.

A new drilling and developing campaign has been started in Aurora upon the Black land. This tract has been among the most important of any in the Aurora field, having turned in over 15-100,000 lbs. of lead in seven years. C. C. Plank holds the first lease upon the tract and is subleasing to operators in Aurora.

### Joplin, Mo.

A very rich strike of ore consisting of both lead and zinc was made in Elm Hollow by William Pierce by drill at a depth of 112 ft. and the shaft sunk later proved the tract richer than the drill record showed. Drifting has been done and good ore taken out. A concentrating plant will be erected later if the ore holds out.

Roach, Radley & Glover made a rich strike on the Roach land lying in the western portion of Joplin. A deposit of zinc blende running 10% to 15% was found at a depth of 100 ft. showing a face of ore 25 ft. thick. The ore is in spar ground and is very rich. Only 12 ft. of drifting has been done, but high-grade ore occurs the entire distance.

The fourth mill has just been completed upon the Rising land west of Joplin, consisting of a richly mineralized 40-acre tract operated by the Symmes Co. Three concentrating tables for the treatment of the fines will be added to the regular mill equipment. The mill shaft passed through an ore body 18 to 20 ft. thick and running 6% to 12% zinc. Little lead has so far been found. Over 150 ft. of drifting has been done and a large dump pile full of ore is ready for treat-

ment. The ore is being removed from the 170-ft. level. The same company is operating a second lease south of the mill upon which a different character of ore is found. One shaft has been sunk upon this lease and some drifting done.

The capacity of the Mikado mill on the Rivington land has just been increased from 150 to 250 tons. This was made necessary by additional development of the lease since the third shaft was completed.

Stewart & Co. owning a lease in the Belleville camp, just north of the Mid-night mine, are draining the property preparatory to resumption. The land has been under water for some time.

Wurtzel & Edwards are opening some rich deposits at shallow levels in the Kansas City Bottoms in the northeast portion of Joplin. A heavy pump was installed to handle the water during the rains, but a smaller one does the work satisfactorily since.

#### Galena, Kas.

One of the richest strikes in years was recently made on the Helen Hunt tract north of Galena. Ore was encountered at 225 ft. and continued to 280 ft. An adjoining lease is also being developed and rich deposits located upon this. Further drilling will be done upon both tracts.

The Hartford Mining Co. operating a lease south of Galena is installing new machinery and has also completed a mill which will be ready for operation as soon as the ground is well opened.

The Herald mill, which has been producing steadily for over a year in the Cave Springs camp, has closed down for 60 days for needed repairs and development work. The incline shaft will be sunk 75 ft. deeper and additional drifting will be done. The drifting will connect the vertical shaft with the incline and a 76-ft. face of rich milling ore will be available.

Butler & Burriss have struck rich ore upon the Bunco lease in Cave Springs. A good body of zinc ore was struck at 74 ft., running 12% to 15%. This ground is being drained by McCullagh and Murdock. The pumps have been run night and day for three months and the tract is now drained to the 80-ft. level. It is the intention to drain the ground to 105 ft. when it will be possible for some 30 or 40 old companies to resume operations who were forced to abandon the mines on account of water. Four new shafts are going down and a number of new leases have been let.

## MONTANA.

#### Butte.

The Butte Coalition mines are being developed to an extent and veins are being opened which will soon place the properties second only to those of the North Butte Co. in point of richness and greatness of ore deposits. The crosscuts extended into the Minnie Healey ground from the Tramway shaft on the 1,300 and 1,100-ft. levels have opened the veins in the Minnie Healey. The veins are full of first class ore and on the 1,100-ft. level a fine body of copper glance has been

opened, assaying better than 70% copper. The company is also drifting on the 1,700-ft. level of the Rarus and has just started a crosscut at the 1,800-ft. level of the Rarus shaft.

The directors of the Reins Copper Co. have adopted a resolution, which will be submitted to the stockholders at their annual meeting in Butte, August 12, providing for the issuance of \$100,000 in first mortgage 6% gold bonds, maturing in five years from the date of issue, with interest payable semi-annually. The mortgage will cover all the property of the company in the Butte district. The bonds are to be issued to pay off the present indebtedness of the company and provide funds for future operations. The directors are Colonel J. M. Gaffey, E. W. Marland, W. P. DeArmit, A. P. Childs, Jr., T. N. Barnsdall, George D. Prentice and W. F. Johnson, all of Pittsburgh. The Reins Copper Co. owns the Combination and several other claims on the east side of Anaconda hill, in Meaderville, and Colonel Gaffey and his Pittsburgh associates have put up a million or more dollars to purchase and develop the property. A small vein was opened last year, but the mine was not a paying proposition and operations had to be suspended. An accumulation of debts remained unpaid and numerous attachments were placed on the property.

The North Butte Mining Co. is again mining to the full capacity of its shaft, and is also cutting skip pockets and stations at the 2,000 and 2,200-ft. levels. It will probably be six weeks before the stations are completed. The first vein north of the shaft will be opened by the station at the 2,200-ft. level and drifting will be done as soon as the station is completed. At the 2,000-ft. level the vein is about 100 ft. north of the station and will not be reached by crosscuts until about a month later. The crosscuts will be continued north to the Edith May and Jessie veins, which have been opened on the 1,800-ft. level. Four hundred feet of new stoping ground will be opened by the two new levels and an immense amount of new ore will be blocked out in a comparatively short time.

Because the mill and lumber men employed by the Amalgamated Copper Co. at Hamilton refused to accept a slight reduction in wages the saw mill at that place has been closed. The company desired to restore the wages that prevailed before the last raise was granted a few months before the panic. The reduction proposed amounted to from 5 to 10 cents per day. The employees at the other mills of the company accepted the reduction and work there continues and the mines are supplied with abundant lumber and timbers.

The Pittsmtont Copper Co. called a holding company for the Pittsburg & Montana Copper Co. has been organized to finance the latter company and pay off its liabilities. The company owns its own smelter and during all the panic continued mining on a small scale ore that assayed about 7% copper. The company has just enlarged its smelter capacity by the installation of a new 250-ton blast furnace. The old 150-ton furnace will be

taken out and another 250-ton furnace put in its place, thus increasing the capacity of the plant to 500 tons per day. A new stand of converters is also being added and the converter building is being enlarged and remodeled. A new concentrating mill of 250 tons capacity is being erected and will be in operation in about two months. Under the management of Oscar Rohm, who has been in charge of the company since the retirement of Ralph Baggaley, the property has been improved and systematically developed. The main shaft of the mine is down 1,200 ft. and a 300-ft. winze has been sunk from the lowest level. There are eight miles of workings and a large amount of good ore has been blocked out. Some of the stopes are 8 ft. wide and full of 7% ore. The highest values are between the 800 and 1,200-ft. levels. The present daily output is from 100 to 150 tons, and that will at once be increased to meet the capacity of the new furnace. The company is capitalized for \$30,000,000 in shares of \$100 each. It owns about 200 acres of mineral ground on the east side of the Butte district and about 1,110 acres at Helena, Elkhorn and in the Greenhorn district.

#### Helena.

According to the report of James W. Neill, engineer for the Boston & Corbin Copper & Silver Mining Co., developments on the Bertha mine consist of about 2,500 ft. of tunnels and drifts and 500 ft. of shafts and raises. The vein is exposed for a length of 1,200 ft. and to a depth of 475 ft. Openings on the lower tunnel show a single ore shoot 400 ft. long and a double ore 225 ft. long. The new vertical shaft is down 225 ft. at the 200-ft. level a crosscut has been run 200 ft. north from which two drifts have been run, each of which have disclosed ore. The ore that has been shipped has averaged 5.64% copper and 7.12 ozs. silver to the ton or a value of \$14.05 per ton. The costs of mining and treatment are given as about \$5 per ton.

#### MISCELLANEOUS CAMPS.

**Basin.**—With the ending of the rainy season the mines in this district are resuming operations. The Truro Mining & Reduction Co. has started up the Buckeye mine and mill and hauling of ore and concentrates to the railroad station will soon begin. The ore from the Buckeye is particularly desired by the smelters. Some trouble has been experienced in the mine with corrosion of the pump linings.

The Comet mine and mill are again running and concentrates are being shipped to the East Helena smelter. In the shaft sinking is progressing at the rate of 3 ft. per day. Another pump has been installed and a station is being cut at the 300 level for still another. With these pumps there will be ample facilities for taking care of the water.

**Kendall.**—Ore has been encountered on the 100 level on the North Kendall. The drift is into the hanging wall about 25 ft. and assays are reported to show good values. The main ore body has not yet been encountered.

The shaft on the Gold Links is now

dawn about 230 ft. and sinking will be pushed until the ore body is reached. A large blower has been installed to ventilate the shaft so that three shifts can be worked.

**Iron Mountain.**—I. F. Steel has been appointed receiver of the Amador mine in the action brought against the Amador Cons. Mining & Development Co. by Mrs. D. E. Mackinnon, wife of the promoter of the mine.

## NEVADA.

**Tiptop.**  
New discoveries are constantly being made in this district. Development operations in the camp are productive of excellent results.

An 8-ft. vein, which, according to panning is said to run \$50 to the ton, has been disclosed beneath the surface on the Yellow Horse claim. The claim is owned by D. F. McCarthy and wife.

Four car loads of surface ore said to be worth \$125 to the ton has been shipped from the Chafey property. Besides this there has been taken out 100 tons of \$30 milling ore. Four men working at the face of the 5-ft. vein are now breaking down about 10 tons per shift. The top and bottom of the tunnel is ore, and the vein is pitching into the mountain directly into the ledge at almost right angles. The main ledge lies ahead of the face of this tunnel 800 ft. and extends for miles in either direction.

Ore of the same character and of good shipping grade from the surface has been found on the Ophir group owned by Magnus Benson and H. L. Edwards. Another outcropping of 2 ft. width is reported to be carrying values of somewhat above \$100 to the ton. The marketing expense for crude ore is \$20 per ton.

**Goldfield.**  
Ore rates over the Clark road to Salt Lake have been reduced to a lower figure than was expected, it being Senator Clark's intention to encourage the shipment of lower grade ores.

From Armagosa an average reduction of 13% is made on all ores to Salt Lake. The rate on \$20 ore has not been changed being maintained at \$4.57 the ton; on \$30 the rate is \$5.75; on \$50 ore the rate is reduced from \$7.75 to \$7.50; on \$80 ore from \$8.75 to \$8; on \$70 ore from \$9.50 to \$9.

From the stations of Rosewell, Queen, Gold Center, Beatty, Rhyolite, Montgomery-Shoshone spur, Original Bullfrog, the average reduction is 3.4%. From there it costs \$5 to haul \$20 ore to the smelter. A reduction of 11% is made on \$60 ore. On the high-grade ores the reductions are small.

The rates from Carrie's Wells, Bonnie Clare, San Carlos and Wagner to Salt Lake are reduced 15.5% beginning with the \$50 ore, which is reduced from \$7.10 to \$6.50. The reduction on \$60 ore is 24.8%, or from \$10.50 to \$8.

The rates from Ralston, Red Rock and Goldfield to Salt Lake are reduced on an average of 17.3%. The reduction on \$60 ore is 27.3%, or from \$11 to \$8.

Throughout the schedule of reductions

the greatest cuts are made on ore averaging \$50 and \$60 the ton, which are of a refractory nature that can now be sent to the smelters at Salt Lake. Material reductions are also made on the \$40 ore, which also means a profitable handling of this grade.

The Loftus-Davis Leasing Co. has been reorganized and the capitalization increased from 50,000 to 250,000 shares. The name of the company was changed to the Loftus-Davis Federated Mines Co. and the number of directors increased from three to five. It is the intention of Loftus, Davis and associates to conduct their mining operations under one head by making this their operating corporation. The first work will be to develop the Great Bend. A 2-compartment shaft will be sunk as rapidly as possible to a depth of 600 ft. and lateral work will be done in all directions, but particularly to get under the old workings and upraise, as well as catch the ledge on its dip. This shaft is already down 100 ft. A hoisting plant and other machinery is now being installed. The old workings recently flooded, have been pumped dry and mucked out. The production of ore is steady and will continue so until the new workings are connected up with the ledge, which will permit of more rapid and more economical handling of the ores. The officers of the new company are: J. P. Loftus, president; J. R. Davis, vice-president and general manager, and H. G. Mayer, secretary and treasurer.

The old camp of Candelaria in Esmeralda county is again active. New machinery and new pumps for the mines have been ordered and the pumps are now being installed. The mines will be worked on an extensive scale and will soon be producing again. The old mines of Candelaria were at one time among the richest silver mines of the United States but were closed down when the price of silver fell.

## Reno.

The Nevada-Commonwealth Mining & Milling Co. is sinking a 2-compartment shaft on its property two miles north of Washoe. A contract has been let to sink to a depth of 200 ft. On July 2 a depth of 65 ft. had been reached. Several stringers of high-grade ore have been cut. Exploratory crosscuts will be run at the 100 and 200-ft. levels. The latter will be 75 ft. below the present workings.

## Rahway.

There are just an even dozen shippers from this camp at the present time, which number will be increased in a short time. The majority of these shippers are sending their ore to the mill, the rest going to the smelters.

At this time there is but one mill in the camp, that of Swiftwater Hill Gates and associates. The Gates mill cannot begin to take care of the business that is offering and Mr. Gates left for San Francisco to order additional machinery. He expects soon to be operating with a capacity of 120 tons a day. In the meantime a 40-ton mill of J. N. Watt and George H. Bradford is on the way in and its promoters expect it also to be soon in operation.

The cost of transportation and reduc-

tion at the Gates mill is \$15 a ton, and the ore that has been shipped there goes from \$30 to \$50 a ton, leaving a good profit to the mine and the mill. In addition to the Gates mill and that of Watt and Bradford, on the way, the Rawhide Water & Reduction Co. also expects to have a 200-ton mill in operation in a few months, and there is still another to follow, behind which is eastern capital. H. W. Throckmorton, representing that capital, has been here for two months past. In addition to the mills mentioned, the Rawhide Mining & Reduction Co., which owns the Murray lease expects to have a 20-stamp plant in operation close to the camp in less than two months. Other mills are spoken of, but there has as yet been no material progress in their construction.

The regular shippers of the camp are the Kearns No. 1 and No. 2, both of which have shipped to smelter and mill. There are besides, the Miller and the lease adjoining on the Coalition, the Owl, Proskey, Lillian, Murray, Edwards and Barlow, Regent, Royal Tiger and Mint. To these will shortly be added the Jordan lease of the Queen Mascot Co.

The Mint lease on the Coalition, located at the base of Grunt hill, is the last holding to get high-grade ore in the camp, and the showing is said to be getting better with development. The strike was made at a depth of 135 ft. The Mint has been operated with a 2-lb. gasoline hoist rigged up with a tripod instead of a gallow's frame, with which 30 tons a day has been taken out.

A strike of considerable importance to the camp, while the values do not as yet run high, was that of the Alta Mines Co., far down to the southern part of the camp. The Alta occupies considerable of the high ground in that section of the district, but the find was made in a draw of the property and is a well defined vein with the same characteristics as those of the Murray vein of the Rawhide Cons. Mining men are of the opinion that the new find is a continuation of the Murray vein, although this would be a remarkable shoot, a stretch of 3,000 ft. Interested in the Alta Mines Co. are some of the leading railroad men of Chicago and Colorado, including H. I. Miller, president of the Chicago & Eastern Illinois Railway Co.; Spencer Oss, president of the National Dump Car Co.; Charles W. Waterman, general attorney of the Chicago, Rock Island & Pacific; H. G. Ridgway, general manager of the Denver & Rio Grande Railway Co.; J. F. Wellborn, president of the Colorado Fuel & Iron Co.; Geo. W. Hawken, president of the Victor Fuel Co., and others.

The Royal Tiger in the western portion of the district has another big strike. The incline shaft is down over 200 ft. At 75 ft. a cressent recently started has encountered an ore body with very good values.

## OREGON.

### Grant's Pass.

There is a general revival of mining in southern Oregon with the arrival of summer. Properties that have been idle for

the past two or three years are being opened again and those that were under development and were obliged to suspend during the financial stress of last fall now have funds to complete the work originally planned. A number of mines that have been operating with small plants, are installing larger mills.

The copper mines are also much more active than they have been for a couple of years. The Waldo properties are operating to their full capacity, treating the ore in the smelter of the Takilma Smelting Co., which is running a 200-ton plant on its mines. The Takilma Co. is employing a large crew of men and has a long train of freight wagons on the road between Grant's Pass and Takilma, hauling coke and matte. The company expects to turn out a greater quantity of matte this season than for any past year.

The old Golden Standard mine of Gold Hill district, which has been idle for over two years has been acquired by the Portland-Gold Hill Mining Co., a close corporation composed mainly of southern Oregon and Portland mining men, among whom are K. K. Kuhl, H. C. Malone, and I. W. Lane. Mr. Kuhl, who was the former manager and owner of the property, will have personal charge of development and operative work. The Golden Standard was one of the best producers in the Gold Hill district up till a few years ago, when its plant became inadequate to handle the larger values of the deep levels. Several thousand feet of underground work has been done. The mine during the months of idleness has been kept in good repair. Very little overhauling will be required, but steps will be taken at once for the placing of a larger mill and reduction plant. There are several thousand tons of rich ore in sight and, although partly base in character, it is stable and reliable in its values.

Colonel J. M. Williams a mining man and capitalist of Eugene has purchased at auction the entire properties formerly owned by the Great Northern Mining Co. located in the Blue River district. The Great Northern mines were at one time one of the richest in the Blue River district and were capitalized at \$1,000,000. They are extensively developed and well equipped, but they have been idle for several years, owing to lack of funds for the completion of development. The ore body is a large one and carries good values. It is the intention of the new owner to resume the development of the property and to shape it for operation on the scale originally planned.

Activity in quartz mining still continues in the Galice district, one of the oldest mining camps in the state. The Alameda Cons. Mining Co. is employing a large force on the Alameda properties, and will soon have the new road to Merfin in shape to begin the hauling in of the heavy smelter equipment. The new plant will be fully installed and ready for operation by the last and possibly by the middle of summer. The Alameda mines are among the best and most deeply developed in the state and the new reduction plant will be kept busy.

The owners of the Oriole have a large

crew employed and are taking out much rich ore, shipments of the best of which are being made regularly.

The Golden Wedge mine is being more deeply developed, and will be operated on a larger scale. This old property has produced a handsome fortune in its time. Its ore body is showing up bigger and richer with depth. The mine is equipped with a mill and concentrating plant.

The Telluride Gold Mining Co. of Seattle has begun extensive development of its telluride claims on Canyon creek, of western Josephine county. These claims were discovered a few months ago, and have proved remarkably rich with development. The veins are from 2 to 4 ft. wide and carry high values in free gold. The property is located in a rich ore zone from which several million dollars was taken in early days by crude methods. Not until recently was the district prospected for quartz. The Telluride Gold Mining Co. has ample capital behind it, and will deeply develop the claims, putting them in shape for operation on a large scale.

While the Ashland Mining & Milling Co. of Los Angeles, Cal., has secured the old Ashland mine near Ashland, it has also taken over under lease and bond the Good Friday mine four miles north of town. Development is progressing under the management of Dr. R. O. Hall. There is a 180-ft. shaft on a 6-in. to 3-ft. vein of ore of good average.

## UTAH.

### Salt Lake.

General Manager D. C. Jackling of the Utah Copper Co. states that the June production of the company will show an increase over that for May. As soon as the tables for June have been compiled the company will draw off its first quarterly report, which will show that the company has something like \$1,500,000 in the treasury. It is understood that the company will declare a dividend not later than September of at least \$2 per share.

Electricity has been turned on at the new plant of the Tintic Co. For a time the machinery will be limbered up, and, until everything is in perfect working order, no notice will be given shippers to begin the consignment of ore to the new plant. As near as can be learned the first charge will be placed in the lead furnaces about July 15, after which date it is planned to accept all the ore that the producers have for commercialization at that point.

A new ore body 15 ft. wide has been opened up between the 200 and 300-ft. levels on the south side of the May Day property. The ore is making for the northern portion of the ground, where the company possesses a good area of virgin ground.

At the Bingham Central-Standard copper properties in Bingham some important discoveries are being made underground. It has been learned that the workings in the Mountain Maid tunnel have tapped the lime belt and, after being driven for about 15 ft. in this formation, the porphyry ores began to come in. This point is about 553 ft. from the portal of

the tunnel. It is said that this is indicative of the approach to ore, the country being traversed by a number of cross fissures.

The Bingham Amalgamated Copper Co. has filed a petition for injunction against the Ute Copper Co. in the district court at Salt Lake city. The claim is made that the Ute has trespassed on the Amalgamated property at Bingham, and the suit is also to quiet the title held by the Amalgamated to the Viola lode. The complaint alleges that the plaintiff company acquired the title to the Viola lode from E. J. Swaner, who filed on it July 3, 1906. It is further alleged that on April 9 the Ute Co. filed on a pretended lode which is called the St. Nicholas. The claim is made that the filing is for the purpose of interfering with the company's right in the Viola lode.

Ore producers who were shipping to the United States smelting plant at Bingham Junction previous to the shutdown six months ago have been notified to commence the shipment of ores in accordance with the terms of the existing contract. As a result of this notice a number of the large properties are preparing to commence the shipment of ore in the immediate future.

Between 70 and 80 men have been put to work at the Boston Cons. Co.'s plant at Garfield with instructions to hurry the completion of the second portion of the great reduction plant with all possible speed. This will give the company eight sections. The first four have been given a complete and successful try-out. The additional four sections will go into commission September 1, when the plant will have a daily capacity of 1,500 tons of rock.

A strike is reported on the Mountain Dell property in American Fork canyon of galena ore in the face of the tunnel, which has been driven a distance of 300 ft. The ore is not in large bunches, but is showing in strong stringers, with the indications very favorable for encountering the precious metals in paying quantity within a short distance. The property was first opened up by means of a shaft to a depth of 300 ft. and ore was found in paying quantities in that portion of the property. Assays showed ore containing 60% lead and 100 ozs. of silver to the ton. It was found to be rather expensive to handle the output in this working and the company moved down the mountain and started driving the tunnel. Another 150 ft. of driving in this tunnel will be necessary to get under the ore zone exposed in the working shaft. It is expected that this work will be completed within 30 days and the property put on a regular shipping basis.

Some fine specimens of rock from the face of the tunnel of the Silver Flat Mining Co.'s property in American Fork canyon have recently been secured. The tunnel was started with the object of cutting a vein of copper ore discovered in the upper workings, which had carried better values as depth was reached. The tunnel is now in 250 ft. and, judging from the formation of the rock, and the copper indications now showing, it is believed that the ore is close. New cars and a

supply of rails have been sent to the property.

Great preparations are being made for the blowing in of the new Knight smelter at Silver City, in the Tintic district, on July 24. The management reports that everything will be in readiness for the opening of this the newest smelter in Utah.

Charles H. Blanchard, president and general manager of the King William Mining Co., states that development work will be started at once on the company's property in the Tintic district. The ground is surrounded by some of the richest property in the district, including the Grand Central, the Eagle and Blue Bell and the Centennial Eureka.

The controlling interest of the Bingham Butte Mining Co. at Bingham has passed from the control of A. L. Hopf, G. A. Bellinger and Ray Kenner to Claude F. Harness, Nick Treloar and Pat Donahue. The deal has been pending for some time and involved a cash consideration of \$145,000.

## WASHINGTON.

Republic.

The lessees of the Republic mine, holding an option for its purchase, have entered into an agreement with J. L. Harper, of Republic, and Wm. L. January, of Detroit, Mich., to assign their lease and option to the second parties, provided the latter pay the first installment of the price agreed on before Aug. 10, 1908, and make good the other payments according to contract. The agreement also makes it binding on the second parties to begin work on the mine, put in machinery and begin work on the incline mine now down 125 ft. below the 4th level, and continue sinking it deeper, said work to be started on or before Aug. 10.

The Silver Lead Mining Co. is to put up a 50-ton mill on its property at Meteline this year, machinery for which has been ordered. This will make the fourth concentrator that will be established in the camp this year. Previous to this season the camp was without a concentrator. With the completion of these mills, the camp will be supplied with concentrators having a daily capacity of 500 tons or ore.

Regular shipments of ore are now being made from the Last Chance mine near Northport to Joplin, Mo., but on a small scale. The mine is looking well and it is stated by Manager Baker, that the force will shortly be increased.

Arrangements are being made for a tunnel contract for a large amount of development work on the Copper King mine at Chewelah to be begun shortly. This mine has excellent showings and is second only to the United Copper in the Chewelah camp, its deposits of copper sulphides being large. The mine is well developed with underground work.

Shipments are being made by the United Copper Co. at the rate of 1,200 tons a month. Development work is also in progress.

Operations have been resumed at the Jay Gould mine, principally in the line of development for the present, although it

is stated that shipment is expected to be begun this fall.

The newly-completed concentrator of the Spokane Lead Mines Co. at Meteline is operating satisfactorily and has proven its full capacity of 150 tons a day. It was expected that shipments would be made this month, to the Pankhandle smelter, but another outlet may be sought.

Orient.

The report of the strike of a large body of gold ore at the Valley Dew mine near Orient has stimulated interest in this vicinity. The ore is reported from a 50-ft. adit cutting the dike at a depth of 50 ft. Assays give an average of \$23 to the ton. It is hoped to begin ore shipments as soon as a half-mile of wagon road can be completed.

There is much activity at the properties lying about Orient, chief among which is the First Thought. This property is sending about 40 tons a day to the Northport smelter, and is paying a good profit.

Chelan.

Work will soon be begun at the Holden Gold and Copper mine near Lake Chelan. A 5-drill air compressor and all machinery necessary for operating five drills are on the way to the mine. Work will be carried on in the three levels. Some 1,900 or 2,000 ft. of development work has already been done underground as well as numerous open cuts in which ore is said to have been found. Ore was found in all three tunnels, but the nature of the ore body has not yet been fully determined. The tunnels have passed through what is probably the footwall, but the vein is not well defined, and the ore seems to grade out into country rock. At places where the ore has been traversed by tunnels, the body seems to be 185 ft. wide.

## CANADA.

### ONTARIO.

Coltalt.

A very large amount of high-grade silver ore has been blocked out at the Buffalo mine. A number of improvements are being introduced that will make this mine one of the best equipped in the camp. Sinking in No. 3 extension is still in progress and a depth of 80 ft. has been reached. Good ore is being taken from No. 4 shaft, but the vein is irregular and lumpy. Good progress is being made with the additions to the mill and cyanide plant and it is expected to have the latter running by Sept. 1.

The Crystal Gold Mining & Milling Co., Ltd., of Wabunipatae, is the name of a new company formed to operate properties in the Wabunipatae Lake district. The company is capitalized at \$500,000, divided into shares of \$100 each with 100,000 shares in the treasury. The directors of the company are: John T. Ryan, president; Gordon T. Jennings, vice-president, and Stafford Higgins, secretary-treasurer. The property of the company is situated in Rathum township between Boland lake and Lake Upper Matamagasing east of Lake Wabunipatae. One 40-acre claim has been patented, while for the other 80 acres patents have been applied for. The formation is diabase, sometimes containing quartz and

chlorite-dolomite rock. A number of veins are known. Considerable gold was taken out 10 years ago. The property is equipped with a 5-stamp mill and machinery, including pumps, hoists, etc., on this property.

A new discovery has been made in the Larder Lake region, on the property of the Great Northern Mining Co., of a vein 18 ins. wide at the surface assaying as high as \$53.94 to the ton.

Plans are being made for the construction of a new 100-ton concentrating mill at the O'Brien mine. It is the intention to build the mill this summer.

## BRITISH COLUMBIA.

Phoenix.

The Phoenix mines and the smelters connected with the different companies operating here will be in an excellent position to make money when copper advances. It is said that the Granby Co. is now making copper for a fraction over eight cents per pound, which gives them a little profit even at the present low price.

Among other time and money saving improvements planned by the Dominion Copper Co. will be a 1,200-ft. tramway from the Idaho mine to the Stewinclair claim, which will greatly facilitate ore shipments from the Idaho. Many other changes considered necessary for profitable operation under present conditions are contemplated around the mines and smelter of this company.

The ore shipments from this district for the week ending July 4 and for the year to that date were:

	Week.	Year.
	Tons.	Tons.
Granby .....	20,522	213,343
Mother Lode .....	2,810	10,170
Oro Denora .....	1,190	12,476
Emine .....	1,190	12,666
Brookby .....	104	101
Rawhide .....	1,250	1,250
Sunset .....	450	450
Mt. Royal .....	45	45
Shawston .....	387	387
Sully .....	80	80
Crescent .....	20	20

It will be noted that the Brooklyn, Rawhide and Sunset mines of the Dominion Copper Co. appear on the shipping list for the above week. This is the first time that shipments have been made from these mines since the shut-down last fall.

Work is proceeding along the usual lines at the Granby mines. More improvements to facilitate handling the product of the mines will be made. The Granby is now making what would amount to 30,000,000 lbs. of copper per year, with steady production.

The Granby smelter during the week treated 19,307 tons of ore; British Columbia Copper smelter, 11,634; Dominion Copper smelter, 2,090 tons.

Rosland.

The Centre Star mine here made good shipments and profits during June. The company is producing a steady stream of ore of more than ordinarily good grade and is making excellent profits.

The Le Roi Two has declared an interim dividend of two shillings per share, payable July 8. This with the dividends of two shillings per share declared in March makes four shillings already paid by the Le Roi Two this year.

The following shipments were made

from the camp for the week ended July 4 and for the year to that date:

	Week. Tons.	Year. Tons.
Centre Star .....	2,000	49,831
Le Roi .....	1,540	42,949
Le Roi Two .....	250	13,319
Carlton .....	30	30
Mayflower .....	35	35
California-Giant .....	35	35
Blue Bird .....	110	110
Red Eagle .....	20	20
Evening Star .....	488	488

Extensive development work is continued on the Giant-California. This work has been going on now steadily for over a year and the ore bodies being driven for are daily drawing nearer. Diamond drilling is being continued on the Le Roi Two property.

The ore receipts at the Cons. smelter at Trail amounted to 5,003 tons, received from the following mines: Arlington, 70 tons; St. Eugene, 600 tons; Snowstorm, 184 tons; North Star, 34 tons; Eureka, 72 tons; Whitewater, 143 tons; Sunset, 42 tons; Westmont, 44 tons; No. 1 Mine, 14 tons; First Thought, 148 tons.

The receipts at the Le Roi smelter at Northport, Wash., were 1,540 tons, including shipments from the Le Roi, First Thought and other mines.

#### Nelson.

The ore shipments from the Slocan-Kootenay district for the week above mentioned were 1,764 tons of high-grade ore. The ore outlook at the St. Eugene is improving as more ore is being opened up and blocked out every day.

At the Nugget mine they are producing ore carrying over \$100 to the ton in gold values. The Sheep Creek district is looking very promising this season. Last week a gold brick weighing 248 ozs., valued at \$1,500, was sent out from the Queen mine, the ultimate destination of which is Helena, Mont.

Work has been resumed on the Bullion mine, Olalla, after a close-down of over two years. A strike of high-grade ore is reported from the Providence.

The Selkirk Mining Co. is the name of the new company that will operate the well known Cork mine, near Kaslo, controlled largely by French capital. The Cork possesses some fine ore bodies, but the ore consists of a mixture of silver, lead and zinc, which is difficult to treat.

A recent arrival here reports the discovery of a very rich copper belt at Tasso harbor, Moresby, Iceland. The ore bodies in places are 300 ft. wide and can be traced for a great distance inland. The ore is mostly low grade, but in places has been intruded by bornite carrying \$60 to \$70 in copper and 12 ozs. in silver to the ton.

## MEXICO.

### Guadalajara.

Patsy Clark, of Spokane, Wash., and associates have surrendered their bond on the Las Moras copper mines in the Ameca district, this state. They still retain the Magistral y Anexas mines in the same district, which were bonded at the same time as the Las Moras and it is stated that they will complete the purchase of those properties. The development work in the Magistral mines has, it is said, been attended by very satisfactory results.

L. H. Taylor, Jr., of Philadelphia, who is also interested in mines in the states of Zacatecas and Guerrero, has been the principal owner of the Magistral and Las Moras mines for several years. The deal with the Clark interests was made by Colin Timmons, a mining engineer of Los Angeles, who has been identified with Mr. Taylor's Mexican mining interests for several years. At the time that the properties were bonded it was stated that the price was \$300,000. The surrender of the bond on the Las Moras will considerably reduce the investment of the Clark interests in the Ameca district.

The Casados mines in the Hostotipaquillo district, this state, are now producing shipping ore to the net value of \$100 a day. This ore, which is taken out exclusively in development work, runs about nine grams gold to the kilo of silver. Shipment is made to the Torreon smelter. The main shaft of the Casados is now down 156 ft. and a ventilating shaft has just been completed to a connection with it. A short crosscut from the main shaft is in the vein 15 ft., with neither the foot nor hanging wall in sight. It is believed that the vein is from 40 to 50 ft. wide at that point. A tunnel on the east side of the property is in a body of good milling ore. The Casados mines are the property of the Cons. Mining Co., of which W. R. Kamsdel of this city is president.

More rich ore has been opened up in the big El Favor mine in the Hostotipaquillo district. In raising from the fourth to the third level in the Candelaria claim an ore body four meters wide, averaging 2,500 grams silver, was cut. This ore is being shipped to the San Luis Potosi smelter. A drift now being run from the fourth El Favor level into the Candelaria claim is in ore running 1,000 grams silver as it falls. In June El Favor shipments amounted to 110 tons.

The old mine known as El Palo Quemado (The Burnt Tree), but now known by the American name of "Old Doc", consisting of 10 claims, and the La Admiración 10 claims in the Hostotipaquillo district, have recently been acquired by Geo. W. Emanuel & Co., of New York city, and a force of men will at once be put to work to clean out the tunnel on the Old Doc mine, in an effort to locate the famous bonanza vein, said to have formerly been worked by the Spaniards. It has been found that only the face of a very rich lead was worked in a primitive way by the Spaniards and the stringer was left practically untouched. The extent of this rich stringer is not yet known. Assays taken from the lead 50 ft. in the tunnel are said to show silver values running from 500 to 600 ozs. to the ton.

### Oaxaca.

Activity in the Sierra Juarez districts continues. The machinery for the new El Carmen and Natividad mills is being taken into the mountains as rapidly as possible. Maurice Clark has several properties under development and preparations are being made at the San Jose de Gracia for the installation of a trial cyanide plant.

Fred Heral has taken up 10 claims in the Nochtlan district. The claims have

been divided into two properties of five pertenencias each, which have been named Esperanza and Santa Cruz.

The Rio Seco Mining Co. has taken up four additional claims near its property in the Etla district.

W. P. Burritt has taken up four claims in the district of Ixtlan. The property has been named "Jessie."

The Commonwealth Mining Co., which has been legalized and registered in Oaxaca is operating the Humboldt mine in the Ocotlan district.

The Zimitlan Mining & Milling Co., whose mine and mill have been closed for the past year, has resumed operations. Charles Frauch, a mine and mill man from the Paquica camp has been sent by the management to take charge of the work.

A survey has been made of the La Canbre mine, in the Magdalena district. The exact length of the tunnel was found to be 1,645 ft., which is the longest tunnel in Oaxaca. The relation of the interior works with the side lines was also established.

For many years the Natividad mine in the Sierra Juarez district has been the largest mine in Oaxaca. About a month ago a new and very rich ore body was uncovered, which bids fair to be the richest ever found in this state. It has been thoroughly opened and sampled by the best assayers in the state of Oaxaca. The par value of Natividad stock is 30 pesos. Two weeks ago it was quoted at 275 pesos and has now risen to 600 pesos.

The largest plant in the San Jose district has just been set up on the Palmilla mine. Work with the big plant has been commenced and the sinking the shaft to the 300-ft. level is going rapidly forward.

The El Tigre and El Refugio properties, in the Taviche district, have been sold outright to Chicago people. Both are prospects with little work done on them but active development will be begun at the end of the rainy season.

A large payment was recently made on the Duende property in the Taviche district. This property is being worked by the Chicago Promotion & Brokerage Co.

A change in the dip of the vein on the Humboldt property in the Ocotlan district brought the vein to be cut by the tunnel several weeks before it was expected. The footwall of the vein contained good values in copper and silver. On cutting the vein, it was found that the values remained nearly constant for the entire width. Rails and track were immediately installed and shipping will be begun at once.

The International mine, in Taviche, owned by Sam Crowthers of San Angelo, Texas, will be reopened. The property has been closed for the past few months awaiting additional machinery.

The San Juan and San Miguel mines, in the Ejutla district have been sold by W. H. Dudley, the former owner, to a Chicago company.

### Cananea.

Should current reports prove true, the Greene-Cananea Copper Co. interests are likely to come into possession of one of the most promising copper properties in the southwest. The absence of good flux-



ing ores on their own ground has been a strong factor toward bringing the Mansfield copper claims to their consideration. This property lies almost directly north of Cananea, in Arizona.

The Estrella Mining & Smelting Co. held a stockholders' meeting in Nogales last week. The company was completely reorganized and a new set of officers and board of directors was elected. This company owns a valuable gold property at Los Janos, a point on the road to Las Chispas and about 35 miles east of the Sonora railway. A meeting of the Mexican corporation has been called and arrangements are under way for a straightening out the titles with the denouncement of additional ground. Plans have been made in Kansas City for financing the enterprise.

Noble C. Banks, formerly general manager of the Cerro Prieto mine, has charge of an exploration party, backed by Pittsburgh people, whose itinerary embraces the entire northern part of the state of Sinaloa. The party started south from the El Fuerte river and will make a thorough report on the country.

Larry Sullivan, formerly connected with the defunct Sullivan Trust Co. of Goldfield, is interested in the San Ignacio district, 80 miles northeast of Mazatlan and he is reported to have already made a large payment on an option upon a property and is grading for a mill to be erected next fall.

W. A. Wadham, of London, England, accompanied by M. H. Burnham has just completed a month's trip through Sonora, in the interests of American and English capital. Negotiations were made for the purchase of four properties—the Batise, Mesquite, La Fiera, and a denouncement which has not been worked. He considered the La Fiera to be the best of the lot and a small force of men under the supervision of John Anderson, was put to work there.

Announcement comes from Mexico City that the federal government's plea for a railway line from Ciudad Juarez to Cananea, has been heeded by the Southern Pacific Co. and that, while no definite time is stipulated, the road will be built. This will open up a large section of good mining country as well as facilitate the delivery of ores to the El Paso smelter by mines already opened in Sonora and western Chihuahua.

Contrary to the general belief, Superintendent Hoffman, of the Democratic Mining Co., announced this week that he would not resume operations, and that the mines under his control would remain inactive until the price of copper is definitely settled above its present value.

Two furnaces were started up at the smelter of the Green Cananea Cons. Copper Co. on the morning of July 11 and it is the intention of the management to start up two more furnaces in a few weeks. The result of the improvements made will be to make it possible to run the plant with a smaller force of men than formerly and to produce copper at a considerably lower cost.

Chihuahua.

The construction of a hydro-electric

power plant on the Conchos river, this state, will supply some 28,000 hp. to the mines and towns from the city of Chihuahua to Parral is under contemplation by the Compañía Agrícola y de Energía Eléctrica del Río Cochos, S. A. The project includes the construction of a dam 28 km. long, above the city of Santa Rosalia.

Canadian and German capital is said to be back of another proposed power-plant enterprise farther up the same river at La Joya which will furnish from 12,000 to 14,000 hp. to the mines in the Parral district.

The old Pahnilla mine owned by Pedro Alvarado is now being operated under a 15-year lease by the Alvarado Cons. Mines Co., composed of A. J. McQualters, Thomas S. Shepherd and J. A. Coram, and capitalized at \$10,000,000. The mine, which has been a rich producer, is now being developed according to modern methods. The workings have been pumped out and new electrically-operated station pumps have been ordered. No attempt will be made to ship ore at present, but all energy will be devoted to systematic development. The ore runs high in silver with some gold. A 1,000-ton concentrating and cyanide plant is to be built to treat the ore.

The El Rayo Mines Co. has sent out the following report to stockholders covering the results from operations for May: Mill ran 25 days and 4 hours; ore milled, 3,382 tons; value of ore per ton, \$18.51; extraction, 56.8%; value of product, \$5,989.71; operating expenses, \$29,788.49; operating profit, \$6,201.22; Pettit Tunnel exploration, \$3,301.16; construction and all other expenses, \$237.32. Total expenditures, \$33,327.07. In addition to this actual extraction, slimes to the value of \$20,717 were impounded, on which the manager estimates an additional profit of \$14,000. The Butters filter plant was started June 5 and is said to be giving very satisfactory results.

The Republica Mining Co.'s Republica mine in the Rayon district is now making a steady production. The following is the report for May: Seven hundred tons of ore were concentrated and 500 tons cyanided. The cyanide plant was only operated intermittently during the first two weeks of the month, but is now running continuously. Thirty-eight tons of concentrates were produced assaying 1,277 lbs. to the ton; total, 48,347 ozs. of silver. The cyanide mill produced 20,137 lbs. ozs. of silver bullion and 20 bars weighing 1,000 ozs. each have been shipped to the refinery at San Francisco. The total value of products for the month was \$12,178.03; operating cost, \$13,999.03; estimated profit, \$19,177.40.

Taxco.

The revival of the Taxco district in Guerrero has been occasioned by the finding of a very rich vein in the old La Borda mine, and another in the La Conquistadora, owned by the Dos Estrellas Mines & Development Co. of Mexico City. The historical Felipe Martel mill upon the property of the latter company is now running to full capacity, and the

custom smelter at Taxco is taxed to the utmost.

The mines at Campo Morado are showing a monthly production of \$300,000. The pay roll is more than \$10,000 a month.

The famous drift of Hernan Cortes known as the Socavan del Rey is again in rich ore. This drift is in 788 meters, the first 90 meters of which is of such size that a man can ride in on horseback.

The Pedregal mine is supplying the La Florida mill with enough high-grade ore to keep running day and night, and the Rosario Co. two miles from the city of Taxco is engaged in working the old Nshocotilan mine and the Rosario mills. Almost all the other mines in the district are being worked on a small scale and much activity is being shown on the Perissima, Annexas de Jennie and the Concepcion y Annexas.

The Guerrero Mining Co. is operating the Piedra Marillo mine in the Balsas River region, this state, is making arrangements to install an up-to-date, oil-burning smelter of 40 tons capacity. The company will also build a standard-gauge railroad from Balsas to the mines and a switch to connect with the Mexican Central railroad at Balsas. T. E. Ritnour is manager of the company.

Guanajuato.

During the week ending June 27 there was an increase in the shipments of bullion, ore and concentrates. Through the office of the Dwight Furness Co. there was shipped concentrates and ore to the amount of \$53,000, which, together with the shipments of others amounting to over \$67,500, shows that the camp is busy. The bullion shipments reached the high-water mark of \$153,000, which, considering the present market, is the highest since silver took a drop. With silver steadily advancing there is no doubt that within the next few weeks the amount of bullion shipped will again be in the neighborhood of \$175,000, which was formerly the average.

Guanajuato.

A terminal of the Mexican Central railroad was recently established in this city, affording the Guanajuato district direct connection with all railroad points in the Republic of Mexico and the United States. This terminal is of far-reaching importance in the development of this district. Two new Shay geared locomotives have arrived at the Mexican Central yards here for the Mexican Milling & Transportation Co.'s Mineral Belt railroad, which is rapidly nearing completion. The locomotives weigh 110,800 lbs. each, have a large boiler capacity and are capable of developing high steam pressure.

For the week ending Friday, July 3, the ores and concentrates shipped through the Dwight Furness Co. amounted to \$160,000, an increase over the previous week of \$17,000.

The bullion shipments amounted to \$150,000, a slight increase over the week ending June 27th, and was divided between the mint at Mexico City and the refineries there and at Aguascalientes.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World*, who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

Charles A. Stoneham of O. F. Jonasson & Co., stock brokers of New York, has taken over all the customers' accounts of the firm of J. J. Bamberger & Co., mining brokers, as the latter has retired from business.

The officers and directors of the Prout Mining Exploration Co., of Denver, Colo., are: John W. Prout, Sr. (president), John W. Prout, Jr. (vice-president), Chas. D. Baker (secretary), Geo. H. King (treasurer), and A. T. Hammons.

The Swansea Extension Mining Co., of Utah, recently organized with a capital of \$100,000 in 10-cent shares, has these officers: President, A. L. Thomas; vice-president, Judge O. W. Powers; secretary-treasurer, Heber M. Wells. The head office is in Salt Lake City.

The Wisconsin Zinc Co., capitalized at \$1,000,000 has been incorporated in Wisconsin by L. L. Hight, W. M. Pike, H. L. Cram, H. P. Sweetser, C. A. Hight, P. E. Coyle, F. W. Batchelder, E. P. Thompson and W. H. Coolidge. Fred Krog of Platteville, Wis., is the company's representative in Wisconsin.

The newly elected officers of the Liston Mining Co. are: Matt Baumgartner, president; Capt. John Gray, vice-president; James Liston, secretary; Sam. Crow, treasurer; Patrick Crowley, John Krehbiel and Clarence Armstrong, trustees. The total expenditures of the company to June 24, this year, amounted to \$18,579.

In reply to a correspondent in California: The Yukon Gold Co. is capitalized at \$25,000,000, of which there has been issued 3,000,000 shares of \$5 each, or \$15,000,000. The officers are: President, S. R. Guggenheim; vice-president, Daniel Guggenheim; secretary, Chas. K. Lipman; treasurer, Morris Guggenheim; assistant treasurer, D. A. Crockett. The board of directors in April, 1908, was as follows: Daniel Guggenheim, Morris Guggenheim, S. R. Guggenheim, Isaac Guggenheim, John Hays Hammond (since retired), A. Chester Beatty, O. B. Perry, Chas. K. Lipman and A. N. C. Terragold. The New York office is at 105 Broadway.

### Official Reports.

#### WYANDOT COPPER CO., MICHIGAN.

The financial condition of the company on March 31 last was as follows: Assets—Real estate, \$500,000; machinery, \$36,655; merchandise, \$4,446; cash and debts receivable, \$32,690; development, \$10,188; profit and loss, \$30,955; total, \$923,934. Liabilities were: Capital stock, \$923,107; accounts payable, \$1,827; total, \$923,934.

#### MEXICO CONS. MINING & SHELTING CO.

The report for the period from July 1, 1907, to April 30, 1908, shows receipts as

follows: High-grade ore, \$169,409; concentrates, \$301,745; pending liquidation, \$37,202; miscellaneous, \$2,783; total, \$811,137. Expenses were: Mining and development, \$171,726; tramming, \$7,965; mill, \$48,900; freight, smelter, taxes, etc., \$139,174; general expenses, \$18,397; total, \$386,168. Thus there remained a balance of \$425,031.

#### COMBINATION EXTENSION MINES CO., NEV.

The report for the fiscal year ending May 17, 1908, shows: Receipts from stock sales, \$17,960; cash advanced by D. McKenzie & Co., \$4,988; total, \$22,948. Disbursements were: Labor, \$15,098; general expenses, \$2,997; legal services, \$510; surveying, \$82; mine supplies, \$1,526; lumber, \$1,896; power, \$2,609; furniture and fixtures, \$19; machinery and buildings, \$900; assays, \$77; tools and fittings, \$449; mine clothing, \$100; patent account, \$130; total, \$24,326. A large amount of development work has been done on this Goldfield property.

#### TRI-BULLION SMELTING & DEVELOPMENT CO.

The company with property in New Mexico had on hand June 30 in cash, notes and bills receivable \$32,000, 3,000 tons of high-grade ore and 29,000 tons of milling ore (based on report of Samuel W. Taylor, general manager) in bins or on dump, making \$220,000, or a total of \$252,000. The value of the completed camp equipment at the Kelly mine is placed at \$296,800. The liquid assets are sufficient to pay the current expenses and all obligations, leaving a large balance to the credit of the company and without any reference to the stock in the treasury.

#### SOMERSET COAL CO., PA.

The financial condition of the company (controlled by the Consolidation Coal Co. of Maryland) on Feb. 29, 1908, was as follows:

Assets—Coal lands, \$7,064,500; plant and equipment, \$1,498,682; sinking fund, \$259,081; contingent assets, \$2,641; miscellaneous assets, \$6,750; suspense account, \$102,601; current assets, \$300,882; securities owned, \$6,550; total, \$9,272,637. Liabilities: Capital stock, \$4,000,000; funded debt, \$2,595,000; miscellaneous liabilities, \$6,750; sinking fund, \$259,081; profit and loss, \$1,268,384; current liabilities, \$803,426; total, \$9,272,637.

#### CENTRAL COAL & COKE CO.

The net earnings for the fiscal year ending May 31, 1908, were \$1,355,072. Deducting \$228,978 for royalties, general expenses, interest, etc., leaves a surplus of \$825,094. Adding to the amount brought forward from the previous year, and deducting from the total dividends paid, makes the surplus on May 31, 1908, \$124,844.

The credits for the year are: Wholesale coal department, \$673,448; retail coal

department, \$26,167; washer department, \$11,951; mining store department, \$173,849; wholesale lumber department, \$24,329; Carson mill department, \$104,881; Keith mill department, \$49,912; miscellaneous earnings, \$90,234; total, \$1,253,071.

Debits are: Royalty credited on coal lands, \$88,933; royalty on timber lands, \$260,603; general expenses, \$77,734; interest on bonds, \$118,173; depreciation washer property, \$4,088; depreciation mill property, \$28,657; interest and exchange, \$8,500; mining department, \$2,370.

#### GENERAL ASPHALT CO.

This is a consolidation of a number of asphalt concerns. The gross earnings for the fiscal year ending Jan. 31, 1908, were \$15,117,605. Deducting \$13,127,207 for operating expenses, and \$1,148,807 for other charges, leaves a balance of \$871,591. Adding to this sum other income of \$161,456, makes the total net earnings for the year \$1,033,047. From this amount has been deducted \$304,880 for excess cost of maintaining pavements under guarantee which were laid prior to the organization of the present company, and there had also been some sundry minor adjustments to surplus, making a total deduction of \$112,921, leaving a net gain to surplus for the year of \$720,125.

#### BURMA RUBY MINES, INDIA.

For the year ended Feb. 29, 1908, the accounts show a profit of £11,822 (\$29,110), from which the percentage payable to the government of India, amounting to £4,356 (\$21,780), has to be deducted. This leaves a net profit of £7,466 (\$17,330), which, added to £9,439 (\$47,105), brought forward from last year, makes a total balance of £18,905 (\$94,535), which the directors recommend should be carried forward. During the year 2,033,666 trucks of ruby earth were washed at an average cost of 7.6d (15.2 cents), per truck, as compared with 1,890,944 at 7.5d (15.1 cents), in the previous year. For the first time more than 2,000,000 loads have been dealt with in 12 months, and the reason why the cost per truck has not fallen proportionately is that a greater amount of rock has been met with in the mines. The continued depression in the market for precious stones has temporarily affected the sale of rubies, and has necessitated the restriction of the output and the most rigid economizing of the company's resources. Since February night work has been entirely stopped, and the rate of coolie wages and all other expenditure have been cut down as low as possible.

Under these circumstances payment of the half-yearly rent, which became due on Feb. 29, 1908, has been deferred, with the sanction of the secretary of state for India, and the declaration of a dividend is also postponed until the demand for rubies revives.

A miner in France is entitled to a pension at the age of 55, provided he has worked in the mines for 30 years. The highest pension received is 15 cents a day—not enough to support the miner.





## Latest Quotations on American and Foreign Mining Stocks.

**Copper, Gold, Silver, Lead, Zinc, Quicksilver.**

(\*) Dividend Payers. (†) Levy Assessments

[illegible]



### Capitalization and Dividends of U. S. Mines and Works.

**Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies.**

Individuals in Capitalization					Individuals in Liquidation												
NAME OF COMPANY.	Authorized Capital (Stock)	Par. Val.	Paid in		Total in		Latest Date.	Latest Amt.	NAME OF COMPANY.	Authorized Capital (Stock)	Par. Val.	Paid in		Total in		Latest Date.	Latest Amt.
			1908.	1909.	1908.	1909.						1908.	1909.	1908.	1909.		
Amec, g.	Colo.	\$1,500,000	81		\$88,179	1907	36.81		May McKinney, g.	Colo.	\$2,500,000	81	\$13,000	\$914,100	July 25, 1908.	80.01	
Adams & L. Co.	Cal.	1,500,000	0		745,000	1909	00		May May, g.	Cal.	1,000,000	1	9,500	19,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Cal.	800,000	0		100,000	1909	00		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,000	0		100,000	1909	13		Miller, g.	Cal.	1,000,000	100	12,000	12,000	Jan. 1, 1907	00.01	
Adams & L. Co.	Alaska.	1,500,															

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— Illustrated.

## Profits in Smelting.

The miner who is subject to the peculiar policy of certain smelters that are in a position to demand sometimes more than their due for treating ore, often wonders what are the profits of these metallurgical works. People who have bought the shares of smelting companies also occasionally question the philanthropy of the management when dividends are declared out of profits. Even the employees of the smelters will speculate on the results of a profitable or unprofitable year, especially when the day arrives on which a change in the salary account, usually is made.

There are other economic factors which make an analytical discussion of smelter profits interesting; these include the dependence of the local population (storekeepers, etc.) upon the successful operation of the metallurgical works. The latter group of dependents upon the smelter have experienced some pecuniary inconveniences as a result of the panic last fall, but there are signs that the situation has improved materially during the last two or three months, and is likely to continue to be bettered in the closing months of the year by the anticipated increase in consumption of the smelter products. Where, however, the operations of a smelter are interrupted by smoke and fume litigation, earnings are severely taxed and what would ordinarily be considered profits might well be classed as a reserve fund to be drawn on by the lawyers and their successful complainants against the smelter.

Improvements in smelting, and the installation of labor saving devices, aid largely in attaining the success which means profits to the operating company and its shareholders.

Consolidation of smelters to economize management and regulate treatment charges has in at least two cases compounded the interest on the capital invested. Technical skill and the payment of a bonus to employees have resulted in far greater profits than were made when the smelters were operated individually.

Reviewing the progress of the American Smelting and Refining Co. since it acquired the Guggenheim plants, at which time the capitalization of the so-called smelter trust was increased to \$100,000,000, the net earnings have been increased by over \$5,000,000 per annum. During the fiscal years from 1903 to 1907 the net earnings grew from \$7,576,785 to \$11,509,670. The figures for the year ending

April 30, 1908, are not yet available, but there is reason to believe that the slump in metal prices has seriously affected earnings.

The dividend payments by the smelter combination from its organization in April, 1899, to July, 1908, amount to the large total of \$43,206,553, of which the preferred shareholders received \$28,706,553, or at the rate of 7% per annum on par, \$100, and the holders of the common stock \$14,500,000. The last quarterly dividend on the common stock was at the rate of 4% per annum. In addition to these dividends there has been created by the combination for its employees a profit-sharing fund, which from 1904 to 1907 (fiscal years) amounted to \$1,297,272.

It is noteworthy that during the period of 1902-3 when the smelter trust's net earnings were \$7,576,785 and only the preferred dividend of \$3,500,000 (7%) was paid, the monthly average price of silver varied from 47.57 to 52.88 cents per fine oz., and lead from 4.075 to 4.567 cents per lb. In 1903-4 when the net earnings were \$7,905,572, the dividends \$4,750,000 (of which \$1,250,000 was on common stock), and the employees' profit-sharing fund was created by the setting aside of \$91,253, the monthly average price of silver ranged from 52.86 to 60.36 cents per oz., and that of lead from 4.075 to 4.475 cents per lb. In 1905-6 when the net earnings were \$10,161,358, the dividends \$6,750,000, and the employees' profit-sharing fund increased by \$449,204, the monthly average price of silver was \$7.832 to 66.10 cents per oz., and for lead, 4.50 to 5.60 cents per lb. In 1906-7 when the net earnings were \$11,509,670, the dividends \$6,750,000 (of which \$3,250,000 was paid on the common stock), and the profit-sharing fund of the employees was enriched by \$540,000, the monthly average price of silver was 65.11 to 70.812 cents per oz., and of lead, 5.69 to 6 cents per lb.

A creditable record has also been established by the United States Smelting, Refining and Mining Co., which since its organization in March, 1900, to July, 1908, has paid common and preferred dividends to the aggregate amount of \$5,478,622 on an issued capital of \$11,846,650. The preferred stock yields 7% per annum, and the common 4%; both \$50 par value.

These enormous profits suggest that the metallurgical industry is a fertile field for fortunes of a kind that depend not alone on the natural resources but on the intellectual application of the principles of economy and shrewd management.



bursed in dividends this year \$450,000, making a total of \$9,435,000 on \$5,000,000 capitalization since organization. The Bunker Hill & Sullivan silver-lead mine in the Coeur d'Alene district, Idaho, capitalized at \$3,000,000, has declared this year \$510,000, making the total dividends to date \$10,296,000. The Nevada mines are making a better showing, and the return of Tonopah Mining to the dividend list in July with \$250,000, or 25 cents per \$1 par value share (now quoted around \$8) brings its total to \$3,650,000 on a capitalization of \$1,000,000.

The metallurgical works generally continue to pay their guaranteed dividends, but have reduced or discontinued payments on other stocks, as a result of the unsettled condition of the metal market. Six of these corporations from January to July this year declared dividends of \$9,548,775, making a total of \$98,108,962 or \$217,925,850 issued capitalization since organization. The American Smelting and Refining Co. is now paying dividends at the rate of 7% per annum on its preferred stock and 4% on the common, both \$100 par, and has distributed so far this year \$4,625,000, making a grand total of \$43,206,553 on a capitalization that has gradually been increased to \$100,000,000 since organization in 1899. The United States Smelting, Refining and Mining Co. is paying dividends at the rate of 7% per annum on its preferred stock and 4% on the common, both \$50 par, and has distributed so far this year \$1,802,041, making a total of \$5,478,622 on \$11,846,650 issued capital since organization in March, 1906.

There is reason to believe that larger dividends will be declared by mines and works during the closing months of the year, when business generally is expected to show a marked improvement.

### Pilfering in the Export Trade.

What do you think a foreign customer's feelings would be were he to open a case of goods consigned to him and find that some miscreants had stolen half the contents en route and filled the vacancy with coal and rubbish? Your difficulty would be to ascertain whether the culprits committed the deed on land or sea. You know what you could do were the same trick tried with domestic customers, but the problem in the export trade is made somewhat more complex by reason of the numerous transshipments after the goods leave the steamer.

For days, perhaps weeks, certain classes of goods ordered by a far distant customer may be held in the transshipment sheds, and during this time there is often an opportunity for a dishonest employee or a stranger, whose inherent desire is to

steal, to rifle a case which is supposed to contain ready saleable goods. True, it is the duty of a watchman or other employee to safeguard the cases against robbers, but man will invariably show his weakness under the strain of long watching, and it is while he is dozing that the theft is usually committed.

When the goods leave the transshipment sheds and are being conveyed into the interior of a country by man, beast, or other means of transportation and are subject to much extra handling, it becomes an easy matter to pilfer a case. How many exporters give careful thought to this phase of their foreign trade, and yet it is one of the more important if it is our desire to maintain the high reputation already gained in markets heretofore supplied by our foremost competitors, Great Britain and Germany.

To be sure, there will be a little extra cost attached to foreign shipments that are made with a view to checking the practice of pilfering en route. One of the first steps to be taken is proper packing. To ship heavy goods in cases made of boards that are only  $\frac{1}{2}$  in. thick, is frequently as hazardous as packing them in second-hand cases and those in a rotten condition, without even a wire strap around them.

Cases used in the export trade with Europe or far eastern countries must withstand rough handling at transshipment ports, consequently they should be built of  $\frac{3}{4}$  or 1 in. boards. It is also advisable to strap and seal such cases; this can be done with lead seals attached to a thin wire. The wire is fastened with nails at suitable intervals, and both ends are inserted in the lead; the lead is then pressed together by means of a special tool made for the purpose, and the cases cannot be opened unless the seal is broken. When these precautions have been taken, the exporter should affix on his invoice: "Cases strapped and sealed; see that the seal is unbroken before taking delivery; no allowance made for pilferage."

If there is one thing that an exporter should not do, it is to stencil or print the contents on the sides of cases. More than once this method of advertising the manufacturer's business has resulted in easing the task of the dishonest persons who are watching for "signs of prosperity." Nothing but the shipping marks, such as appear on the invoice and the bill of lading should be put on the cases. This will not only check the curiosity of the pilferer, but it will also save the importer much inconvenience. Of course, before marking a case the exporter will see that all previous lettering has been erased to avoid confusion.

Goods that are properly shipped will

not be broken nor stolen en route, and because they are well packed importers cannot help to commend American exporters for their care and enterprise.

### Zinc Ore Imports.

Interest in zinc mining has centered not alone in the fall in market prices of ore and spelter, due to a smaller consumption, but also in the import trade with Canada and Mexico.

The question of eliminating the 20% *ad valorem* import duty on a certain class of zinc ore as specified by the tariff schedule is still to be settled. This explains why no less than 40% of this year's imports of zinc ore are classified as "duty-free."

According to government returns just received the imports of zinc ore from Mexico and Canada for the first six months this year totaled 19,758 tons, having an invoice value of \$247,678. Of this quantity the dutiable zinc ore amounted to 8,037 tons with an invoice value of \$119,751. The remaining 11,721 tons, valued at \$127,927, was classified as "calamine," free of duty. Compared with the total imports for the corresponding six months last year, there is shown a marked decrease.

Mexico's proportion of this year's imports of zinc ore is 17,301 tons, valued at \$227,203, equivalent to 87.5% of the total quantity received by the United States during the six months ending with June. Over 35% of the Mexican ore, namely, 6,146 tons valued at \$103,300, is dutiable, the remainder being entered free.

Canada (British Columbia) sent 2,457 tons, valued at \$20,475, to the United States between January and June this year. Of the total, 1,891 tons, valued at \$16,451, were put on the dutiable list, and the remainder were called "calamine," free of duty.

During the six months the market value of domestic zinc ore fluctuated between \$37.75 and \$44 per ton for high-grade, and \$30 to \$41 on the assay basis of 60% zinc. The extreme monthly average prices during this period were \$35.63 in January and \$32.10 in June; while last year the averages ranged from \$38.71 in March to \$44.90 in June. In other words, the average decrease in this year's prices as compared with the first half of 1907, is about 40%.

Domestic production of zinc ore shows a considerable falling off this year, amounting to no less than 30% in the Missouri-Kansas district alone.

The probability is that there will be little improvement in either domestic mining or in the import trade for some months to come.

# Mining Camp of Topia, State of Durango, Mex.

By T. C. GRAHAM.

Topia is and has been famous for generations for richness of its silver-lead deposits.

The camp is situated upon the western breaks of the great Sierra Madre range, and is reached either from Tephuame the northern terminus of the Guanacavi branch of the International, from the city of Durango, or from Culiacan, the capital of the state of Sinaloa on the Pacific coast, which in its turn is accessible to the sea by a small railroad to Altata and also by the extension of the Harriman railroad system, which will finally reach Guadalajara and which was opened for traffic, into Culiacan on July 4, this year.

Doubtless the policy of this new railroad will evidently be to build feeders to the eastward to tap the many rich mining camps that lie upon the western flanks

*History and development of this famous silver-lead district. Extension of railroads will open up vast mineral territory.*

*Features of geology. Veins worked at a profit for over six miles. Analyses of the ores. Labor situation. Electricity for lighting and power.*

in droves, but called themselves patriots; then there has always been the ever present freight question; this has really been the chief detriment that the west coast has had to contest against. This is now to be overcome and the foresight of the men who have grasped this fact will not

they evidently preferred the more picturesque route, via precipices and rocky chasms.

Topia was first visited by the Spaniards in 1569, and mining was commenced in 1601. Then the Indians rose and destroyed the settlement; owing to their kind attentions twice it was fired and the Spaniards slain.

Situated as it was, it suffered much from savage raids, and during the wars of independence, Topia was plundered by both parties, which strenuous life it continued to enjoy from patriotic attentions until quite recent years.

In spite of all these setbacks Topia has been a great producer. No records exist of the production, so we can only roughly estimate what it was by the large amount of work done.

Any mineral veins that exist in the



Panoramic View of Topia.

of the mother range; a glance at a map of Mexico, with the mining camps marked, will show their number and most of their names being familiar already, stamp the importance they bear to the mining world.

The building of the extension of the Harriman system paralleling the coast line and reaching as far south as the capital of the great state of Jalisco is going to have a most beneficial effect upon the vast mining interests, which it will tap. This is without doubt the richest mineral portion unexploited in Mexico, if not in North America. It is not new, in the ordinary sense of the word, for it has been worked by the Spaniards since their occupation of the country. Those very extraordinary people did well, better even than their successors, who in spite of more complete knowledge and with the advantages of machinery have not made such a brilliant financial success, as might be expected. There are reasons for this: Only a few decades ago the country was at the mercy of the single bandit or his brothers who went

only make the railroad money, but will render possible the development of a rich mineral section.

Presumably Topia will not be neglected, when the policy of the inauguration of "feeders" is made under conditions of cheap transportation Topia and her neighboring camps can put out a deal of ore, and as eventually a large custom smelter must be built probably at Mazatlan, her lead values will count.

The railroad surveys have been made from Culiacan to Topia, two by the Topia Mining Co. and one by the F. C. Occidental, which operates 38 miles of road from Altata to Culiacan. The engineers encountered no great difficulties; the route is by the Culiacan river, the Quebrada of Tamazula, then slightly to the south, via Berinosa. The writer is assured that from an engineering point of view, there are only some dozen miles of hard work. The adventurous stranger, who has made the trip on mule-back hardly credits this assertion, but he fails to remember that trails and old Spanish ones at that do not take railway grades;

greater portion of the Sierra Madre are concealed by volcanic overflow covered with tufa. It is only in the breaks or "quebradas" upon the western slopes that the veins are exposed, and the Topia mining district is situated right in one of these.

The veins are true fissures; in places surface ore has been enriched by natural leaching and redeposition. There are 15 large known lodes, their general direction being N. 55 degs. E., and many smaller ones. All have produced and the veins have been successfully worked for a known distance of over six miles. Their general width is 18 ins. and depth of working may be placed at 700 ft.

From the 700 level down, values decrease, but the vein widens in the face of the tunnel of the Topia Mining Co., which has 1,000 ft. of backs, where they are 3 ft. wide.

General character of the ore is silver-lead carrying small quantities of gold and copper. Lead is in the form of galena,

principally mixed with zinc blende; silver is argentite and copper as cuprite. It is believed that at depth a copper belt may be encountered, which in a measure to be verified in the Siete Amigos mine where 8% copper and better gold values have been found.

Regarding development done in the Topia mines, the Topia Mining Co., an American corporation, has driven a tunnel at right angles to the veins and it is in 5,700 ft., the face of the same being

are numerous other workings in the lesser mines, of which there are a great many.

The principal ore exported is shipped on mules to Tepelhuanes, then by rail to the custom smelters at Torreon, Monterrey or Aguascalientes. Little goes to Culiacan, because the ore is exported from there to the United States and an import tax is levied upon its lead contents, which the Mexican smelters pay. Also, it is claimed by the Topia shippers

of the north and the south, and with all the advantages of an excellent harbor and cheap ocean rates.

Present cost of mule freight from Topia to Tepelhuanes is \$36.25 (Mexican currency) per ton, and to Culiacan \$29; but for reasons already stated most ore goes to the interior. The freight rate from Tepelhuanes to the smelter is less than from Culiacan to Altata by rail, then by steamer north.

The export ore (sorted) from Topia



Map of the State of Durango, Mexico.

1,000 ft. below the surface. In all, this company has nearly two miles of workings.

On the Salvador Loper property there is an equal amount of development, while in La Perla Mining Co., controlled by the MacDonald brothers of Guanajuato fame, there are 2,000 meters of drifts; in the Amador, 500 meters, and 500 meters in the Siete Amigos; there

that they do not receive as fair treatment from the ore buyers on the coast, as they do from those of the interior. How far all this will be changed by the new railroad remains to be seen. The conditions will force the erection of a custom smelter at some advantageous point. So far Mazatlan seems to be the best geographically, being midway between the great ore producing districts

assays on an average per metric ton, 4 kgs. silver, 3 grams gold, 45% lead and 1% copper. The concentrates running 2½ kgs. silver, 2½ grams gold, 65% lead and 1½% copper.

Most of the power used locally is furnished by the waters of the arroyo or Topia river, which flows in a deep gorge, nearly 1,500 ft. below the town. As there are great fluctuations in the water

flow, which is not always satisfactory, a company has been organized to put in electric plant, for motor power and lighting purposes. A concession has been obtained from the state government, granting exemption from taxes, right of way, privileges, appropriations of lands, etc., and arrangements have also been entered into with the municipality for lighting the town for 30 years.

General supplies in Topia are high. Wages, as follows: Miners, \$1.50 to \$2 per day; peons, \$1 to \$1.25; timbermen, \$1.75 to \$2.50. Most work is done on contract for about \$30 per meter. All these figures are in Mexican currency. The climate is excellent; altitude above the sea, 5,570 ft. and miners enjoy remarkably good health.

### Commerce of the Philippines.

The total trade of the Philippine islands during 1907, exclusive of gold and silver, now free government entries, was as follows: Imports, \$30,453,810; exports, \$33,097,867; an increase, as compared with 1906, of \$4,050,042 in the imports and of \$454,975 in the exports. The imports in 1907 from the United States were valued at \$5,067,538, and the exports to this country at \$10,929,387.

Iron and steel, including machinery, are among the chief imports of the islands wherein American manufacturers should increase their trade, in which they now hold a fair share considering the little effort put forth to secure it, as will be seen by the following statement showing the imports from the United States in 1907:

Rails for railways, \$11,195; sheets and plates, \$99,697; structural iron and steel, \$107,940; tools, \$43,716; cutlery and builders' hardware, \$17,643; castings, \$27,653; pipes and fittings, \$39,464; all other articles, \$136,877; total iron and steel, \$474,184. Machinery—electrical machinery, \$56,574; parts of, including steam engines and locomotives, \$30,317; all other machinery, \$203,182. The total value of iron and steel and machinery was \$764,257. The grand total of these imports into the Philippines in 1907 amounted to \$2,292,328.

In cement, out of a total import of \$319,319 in 1907, \$547 worth was imported from the United States. In chemicals, etc., out of a total import valued at \$411,889, the share of the United States was \$84,280. In scientific instruments the United States holds the greater part of the trade.

The imports of illuminating mineral oil from the United States in 1907 amounted to \$635,734 in a total import of \$859,278, which was more than double the imports of the American product in 1906.

**Spanish Pyrites Exports.**—The shipments of pyrites from Huelva, Spain, to all countries excepting domestic and Portuguese, amounted in 1907 to 2,394,570 tons. Of this quantity the United States received 522,828 tons, Great Britain, 533,706 tons, Germany and Holland, 774,897 tons, France, 263,928 tons, Italy, 110,462 tons, Belgium, 81,210 tons; the remainder going to various other countries.

### Rapid Method for Estimating Arsenic.

BY HARLEY E. HOOPER.\*

after exhaustive trials of the usual volumetric and gravimetric processes, which were all found to be either too slow and tedious, or to require too much delicate manipulation for rapid technical work. It is suitable for sulphide or oxidized ores containing upwards of 1% of arsenic. Such ordinary constituents of the ores as lead, copper, zinc, iron, manganese, or nickel do not interfere, being either precipitated as oxides or else having no reaction with the iodine thiosulphate titration.

The reactions which take place are as follows:  $As_2O_3 + 4KI = As_2O_5 + 2I_2 + 2H_2O$  and  $2Na_2S_2O_3 + I_2 = 2NaI + Na_2S_4O_6$ .

The solutions required are:  $Na_2S_2O_3$  10.0 g. per liter, then 1 c.c. = .005 gm. of arsenic.

Sodium hydrazone 25% solution.

The sodium thiosulphate may be standardized either against copper or arsenious oxide.

**Copper.**—Take 0.3 gm. of copper, dissolve in 10 c.c. dilute nitric acid, boil off nitric fumes, add ammonium hydrate till just alkaline, boil off the excess of ammonia and then add 1 c.c. of glacial acetic acid, cool, add potassium iodide and titrate with sodium thiosulphate. Then the copper value multiplied by 75 and divided by 127.2 gives the arsenic value of the solution.

**Arsenious Oxide.**—Take 0.264 gm. of pure arsenious oxide, add 5 c.c. of concentrated nitric acid, evaporate to dryness and heat strongly for a few minutes, take up with 25 c.c. sodium hydrazone solution, warm and then make up the bulk of the solution to 50 c.c., neutralize with concentrated hydrochloric acid and then add 25 c.c. in excess, cool, add potassium iodide and titrate until the solution becomes perfectly colorless. Test the solution with starch, and if it shows any deep blue coloration the standard must be repeated.

**Treatment of Ore.**—For ores containing about 20% of arsenic take 0.5 gm., place in a 12-oz. tumbler beaker and add 10 to 15 c.c. of a moderately strong solution of potassium chlorate in concentrated nitric acid, evaporate gently to complete dryness and allow to heat for a few minutes to get rid of all oxidizing matter. Cool, add 10 c.c. dilute ammonium hydrate, bring to boiling to disintegrate the mass and then add 25 c.c. of the sodium hydrazone solution; boil again and filter hot, and wash with hot water. The filtrate should not exceed 50 c.c.—if it does, evaporate down to about 50 c.c.; neutralize with concentrated hydrochloric acid and treat as in standard.

The proportion of hydrochloric acid to the bulk of the assay should be about one-half or three-fifths; if less acid be present a reverse reaction sets in, the arsenious oxide being oxidized to arsenic oxide, shown by the color going and coming, during the titration. If too much hydrochloric acid be present the potassium iodide will not dissolve and the sodium thiosulphate is decomposed and sul-

The following method was arrived at

phur is precipitated, disguising the finish. The titration should be done slowly, especially towards the finish, and if the yellow color returns a few drops of thiosulphate will discharge it, and the higher reading should be taken.

The starch indicator is of no use in the titration, but may be used to confirm the finish. In the strong hydrochloric acid solution the thiosulphate will not discharge the starch color. For exact work it is advisable to take a blank assay of water and hydrochloric acid in the right proportions, add potassium iodide and titrate. This is to allow for any free chlorine being present in the acid.

If antimony be present, instead of dissolving the ore in nitric acid it should be fused with sodium peroxide in a nickel crucible, the alkaline water extract being treated as before.

The following experiments were performed to test the accuracy of the method:

The use of starch gave the following results: 50 c.c. of water plus 30 c.c. hydrochloric acid plus potassium iodide took 0.1 c.c. of standard thiosulphate, giving an instant finish, and, on the addition of starch, no color. Similar amounts using starch required from 0.5 c.c. to 1 c.c., and then would show no definite finish.

Effect of varying hydrochloric acid: A solution of sodium arsenate in water containing the equivalent of 0.1 gm. of arsenic in 50 c.c. was used in each case.

Arsenic Hydrochloric Thiosulphate solution, c.c. acid, c.c. required, c.c.			
1.....	50	10	22.1
2.....	50	25	22.2
3.....	50	30	22.2
4.....	50	50	about 22.0

In 1 the color went and came during the titration.

In 2 the finish was fairly sharp, but the starch gave a color on standing.

In 3 the finish was sharp, and the starch gave no color on standing.

In 4 the potassium iodide did not dissolve until well on with the titration, and towards the end the thiosulphate was decomposed, precipitating the sulphur and disguising the finish.

The effect of varying sodium chloride was as below:

Arsenic Hydrochloric Sodium solution r.c. acid, chloride, Titration, c.c. c.c. gm. c.c.			
1.....	50	30	2.5 22.1
2.....	50	30	5.0 22.2
3.....	50	30	10.0 22.5
4.....	50	30	20.0 22.2

In 3 the sodium chloride only dissolved during the titration, and in 4 a considerable portion was left undissolved, rather disguising the finish.

Effect of potassium chlorate: A blank assay was done, using 15 c.c. of the acid potassium chlorate solution and evaporated to dryness. The titration required only 0.1 c.c. of standard thiosulphate.

**American Nickel Imports.**—During the five months ending with May the imports of nickel in ore and matte, principally from Canada, amounted to 6,900,109 lbs., as against 7,872,337 lbs. in 1907. The decrease shown for the current year is 972,228 lbs., or about 12%.

\*Abstract of paper read before British Inst. Mg. & Met., Feb. 20, 1908.

## Production of Copper in United States.

By L. C. CRATON\*.

The production of copper in the United States in 1907 was 868,906,491 lbs. From the records figures of 1906 this is a decrease of 48,809,191 lbs., or 5.6%—the largest actual decrease ever recorded and the largest relative decrease since the American copper industry became important. This is the first time since 1901 that the annual production has been smaller than that of the preceding year, and the first time since 1872 that it has been smaller than that of the second preceding year.

In the following table the production for 1907 is apportioned to the states in which the copper was mined. The total is made up of the fine copper content of blister produced and of the smelter output of ingot and anode copper from Michigan. The production for 1906 is given for comparison.

PRODUCTION OF COPPER IN THE U. S.  
(Smelter output, in pounds fine.)

	1906.	1907a.
Alaska .....	8,685,646	7,034,762
Arizona .....	262,566,103	256,778,437
California .....	28,122,202	33,596,502
Colorado .....	7,427,253	13,998,496
Georgia .....	17,192	(b)
Idaho .....	8,578,046	9,707,299
Massachusetts .....	9,744	(c)
Michigan .....	229,696,720	219,131,003
Minnesota .....	1,247	(c)
Montana .....	294,701,252	274,263,789
Nevada .....	1,090,484	1,998,164
New Mexico .....	7,415,508	10,140,140
North Carolina .....	582,209	544,840
Oregon .....	7,415,508	7,415,508
Tennessee .....	17,809,442	19,475,119
Texas .....	64,217	66,810,370
Utah .....	50,412	69,192
Virginia .....	31,694	57,008
Washington .....	2,125	192,562
Wyoming .....	166,117	43,024,904
Ala., Ga., Md. ....		90,455
Mo. and unapportioned ..		1,299,045
Total .....	917,805,482	868,906,491

(a) Subject to final revision.

(b) Included with Alabama and Maryland.

(c) Requested production of blister copper; returns from one company not satisfactory. Only 674,244 lbs. from Wyoming have been reported as refined copper or blister exported or in stock.

(d) A small portion of this total was reported by one company in the form of electrolytic instead of blister copper. To compensate for the loss in refining, these are added *pro rata* to the states concerned the approximate copper content of the blue-slate recovered in the production of this electrolytic copper. No allowance can be made for the probable small difference between the quantity of this company's fine copper in transit to the refinery during the latter part of 1906 and the quantity in transit during the corresponding period of 1907.

Of this quantity, approximately 10,675,018 lbs. in blister were produced in foreign smelters from domestic materials exported. In addition to the domestic materials handled, smelters in this country turned out as blister 61,145,648 lbs. from foreign ore, concentrates, and matte. Domestic blister containing 42,550,963 lbs. was exported unrefined, while blister from foreign sources containing approximately 183,350,132 lbs. fine copper was imported for refining in this country.

The production in 1907 of refined new copper of domestic origin was 784,271,427 lbs., a decrease of 103,410,960 lbs., or 12.2%, from 1906. The total output of refined copper (exclusive of domestic scrap, etc.) by domestic refineries in 1907 was 1,032,516,247 lbs. The details of pro-

duction for 1906 and 1907 are shown in the following table, which is based on actual returns from all refineries:

The 1907 figures for domestic electrolytic include 34,917,988 lbs. Lake copper which were refined electrolytically; those for 1906 contain 24,017,833 lbs. Lake copper. The figures for domestic casting exclude Lake copper and copper recovered from secondary materials.

In addition to the above production of refined copper, 25,129,617 lbs. (of which 8,316,801 lbs. were electrolytic and the balance casting) were recovered during the year by the regular copper refining companies of the country from domestic scrap, drosses, etc., and returns from practically all the known refiners of secondary materials indicate that 35,355,960 lbs. additional were turned out by them as casting copper and in alloys. The copper produced from secondary sources in 1907 was therefore somewhat over

PRODUCTION OF FINE COPPER IN THE UNITED STATES, 1906 AND 1907.  
(In pounds.)

	1906.		1907.	
	Domestic origin.	Foreign origin.	Domestic origin.	Foreign origin.
Electrolytic .....	648,814,592	191,370,022	592,326,468	245,967,811
Lake .....	205,608,282		178,334,141	
Casting .....	33,456,413		13,410,478	3,182,696
Total .....	887,882,287	191,370,022	784,271,427	249,248,528
Total output domestic refineries ..	1,079,652,409		1,032,516,247	

62,000,000 lbs., or more than 7.5% of the year's production of new copper.

Returns from all the Lake and electrolytic refineries are practically complete and show that the following stocks of refined copper were on hand at the beginning and end of the year: Jan. 1, 1908, 125,745,796 lbs.; Jan. 1, 1907, 467,191 lbs.; stocks increased during 1907, 79,248,615 lbs.

Undelivered sales are almost entirely excluded from these figures. Stocks carried by consumers and brokers have not been estimated. In addition to these stocks of refined copper there were at smelters, in transit to the refineries, and at the refineries blister copper and material in process of refining to the amount of 135,310,230 lbs. on Jan. 1, 1907, and of 175,251,659 lbs. on Jan. 1, 1908.

The apparent consumption of refined new copper in the United States in 1907 was about 485,000,000 lbs., as compared with about 685,000,000 lbs. in 1906. One method of deriving these figures is based on the total refinery output. The data are as follows:

CONSUMPTION OF REFINED COPPER.

	(In Pounds.)	
	1906.	1907.
Total ref. output ..	1,079,652,409	1,032,516,247
Ref. copper imp. ..	28,191,653	(a)
Stock, beginning ..	72,770,417	46,497,181
Total avail., sup. ..	1,179,513,879	1,079,019,428
Ref. copper exp. ..	646,750,711	645,498,007
Stock, end .....	46,497,181	125,745,796
Total withdrawn ..	493,247,892	591,243,893
Appar. consump. ..	686,266,987	487,771,625

(a) Comparison of Import and refinery figures indicates that no unmanufactured refined copper was imported into the United States in 1907.

(b) Figures furnished by the Bureau of Statistics and reduced to terms of refined copper.

It is probable that, in addition to the

consumption above shown, most or all of the 60,000,000 lbs. or more of reworked copper was consumed.

## Tungsten in Nevada.

Tungsten, one of the rare earth minerals, is extensively used in the manufacture of incandescent lamps which give a brilliant white light of pleasing quality. Appreciable quantities of tungsten are also employed in steel making, and for other purposes.

The deposits are on the west slope of the Snake range, south of Wheeler Peak, about 35 miles from Ely, the nearest railroad station. The tungsten bearing minerals found here are humberite and scheelite. The vein material is hard and is difficult to mine and varies so greatly in amount and character within a few feet that the value of the deposits cannot easily be estimated.

Considerable development work has al-

ready been done on the deposits, and means are at hand for further exploration, for water power is available for the generation of electricity for drilling and milling, timber can be had for mine timbers and fuel, and adjacent ranches would furnish all needed general supplies.

## Carnotite in Colorado.

The mineral carnotite, which was first found in Colorado, is a source of the rare elements uranium and vanadium, and has yielded traces of the still rarer element, radium, so that deposits containing it are of peculiar interest. The deposits are in western Routt county.

These deposits, which also contain other rare minerals, are situated at the foot of Blue Mountain, formerly known as Yampa plateau, and are similar to those on Coal creek, Rio Blanco county. The ores present a beautiful display of colors. The carnotite, which constitutes a relatively small percentage of the minerals found, occurs in the form of a film or thin crust of powdery material of bright canary yellow color.

A yellow mineral which closely resembles carnotite in color and appearance, and which occurs in even greater amount, proved, on testing, to be a vanadate of copper. Chemical tests of the ores have shown the presence in them of a copper silicate, which is believed to be the first selenite discovered in the United States.

The metal cobalt when pure has a grayish color with a reddish tinge. It can be run into plates, grains or small fibers, according to the temperature employed. The specific gravity of pure cobalt is about 8.

\*Advance statement. U. S. Geol. Survey.

# Some Striking Features of Rand Gold Production.

By RALPH STOKES.

With the declaration of the gold output for June, the Witwatersrand fields record



RALPH STOKES.

an aggregate yield amounting, since the inception of operations in 1887, to the easily "remembered" total of £200,000,000 (\$1,000,000,000).

This wonderful achievement forms a landmark in the progress of industrial expansion, from which one may fittingly survey the tendencies of recent advancement and of

forthcoming developments. In a broad review, such as this, it would be unfitting to discuss the minor points of technical improvement, such as the economics of modern tube milling, of heavy stamp battery practice, of higher stamp duties, of more expeditious slime treatment methods and other features, each of which provides a basis for lengthy dissertation. But we may advantageously note the gen-

*The Transvaal has produced to the end of June \$1,000,000,000 in gold. Factors that have influenced winning and milling. Chinese and Kaffir labor.*

*Robinson, under American management, to be greatest gold mine in world, producing eventually over \$7,000,000 per annum. Dividends paid by this mine amount to \$20,030,000. Working costs are low.*

the showing for the half year to stand as follows: (Rand only.)

	Yield.	Stamps.
January .....	\$11,242,000	8,410
February .....	10,842,000	8,380
March .....	11,518,000	8,425
April .....	11,309,000	8,450
May .....	11,618,000	8,475
June (est'd) .....	11,500,000	8,500
Total for half year.	\$68,031,000	.....

Before the war, the rate of production

Another feature of the ubiquitous labor question has been the reduction of white wages and contract rates, consequent upon the futile strike of miners last year. Diminution of wage bills has been largely responsible for the wonderful reduction of working expenditures which is now surely retrieving the lost confidence of British and Continental investors in the Rand mining industry. All along the line of reef, the cost sheets are revealing the results of stringent economy.

The company which has now gained the most brilliant distinction in this connection is the Robinson, under American management and under the control of Messrs. Wernher, Beit and Eckstein. For several reasons, this renowned mine merits special notice—in part historical and more notably on account of a scheme of expansion resolved upon a few days ago, which will place it *facile princeps* among the world's gold producers and which at the same time provides a practical instance of the greater benefits accruing to Rand companies from the policy of rigid economy. Upon the Robinson



Simmer & Jack Gold Mining Company.

eral records of increasing production and decreasing costs, and add interest-subsistence to the review by reference to a most striking example of individual progress.

For the last few years, the outside world has heard *ad nauseam* of the Transvaal's labor troubles, of their attempted solution by the importation of 60,000 Chinamen and of the recently enforced exportation of these eastern immigrants. These labor troubles have, indeed, been far from visionary and being uppermost in the minds of those controlling the gold industry, have at all times received the warmest and most persistent discussion. For this reason, sight is often lost of the fact that, even today, the producing capacity of the mines continues steadily to increase in magnitude. Upon making an estimate of the June yield, we find that

attained a maximum of about \$80,000,000 per annum. Placing the above half yearly total at the end of the past war declarations, the following record of advancement, the more striking in the light of the gradual diminution of the ore's grade, is manifest:

Year	Yield.
1901 .....	\$ 4,971,000
1902 .....	35,177,000
1903 .....	59,515,000
1904 .....	76,018,000
1905 .....	97,955,000
1906 .....	115,712,000
1907 .....	129,462,000
1908 (6 months) .....	68,031,000

The increase since the commencement of Chinese repatriation has only been maintained owing to the unprecedented abundance of Kaffir labor which has, upon several mines, completely replaced the forces of Asiatics of a year or two ago.

total working costs have been carried down to the unsurpassed figure of \$3 per ton. This obviously bears most satisfactorily upon profits—for the reduction has not been effected at the expense of the milling grade—which now approximate \$4,800,000 per annum. But a further consequence of far reaching importance lies in the fact that it throws enormous tonnage of formerly unprofitable ore into the ranged payability.

In the Central Rand, the Main Reef series comprises the parallel "Main Reef," "Main Reef Leader" and "South Reef." The two latter have proved the mainstay of the region. The comparatively wide low-grade Main Reef itself has in sections been mined in conjunction with the "Leader" which overlies it. In some places these two bodies are practically in contact, but generally there is a parting of a foot

or so of so-called "interbedded dike" and quartzite.

In the Robinson the Main Reef has been for the most part left lying in the foot-wall of the Leader slopes. But a thorough sampling of the Main Reef where exposed in drives and elsewhere shows that there are about 750,000 tons available, which can be cheaply broken out and which should yield approximately \$5 per ton. There are more extensive sections of the mine where valuation of the underlying Main Reef has yet been impossible. In view of the positive data obtained and prospects of further developments, the directors now determine to increase the milling capacity of the company from 42,000 tons per month to 53,400 or 55,000 tons.

To demonstrate the significance of this enlargement and the future status of the world's greatest gold producer, it is advisable to briefly note the following records, which have, however, been temporarily surpassed by the Simmer & Jack mine with its 320-stamp mill.

#### ROBINSON OUTPUT.

Month.	Tons.	Yield, ozs.	Profit.
Jan. ....	40,300	25,304	\$279,900
Feb. ....	38,300	24,960	379,000
Mar. ....	42,000	25,483	392,000
April ....	41,600	25,410	392,000
May ....	42,500	26,150	411,000

(210 stamps running throughout.)

Assuming, as can reasonably be done, that the Main Reef Leader and South Reef can maintain this rate of yield, and that the extra tonnage of Main Reef produces an average of \$12,000 (\$60,000) per month, this mine will be turning out gold at the rate of over \$7,170,000 per annum.

It must also be noted that working costs on the total tonnage should certainly not exceed 12s or \$2.95 per ton and that the working profits should be in the neighborhood of \$5,150,000—figures suggestive of a corporation or group, rather than the single mine.

The Robinson is, of course, not a property which requires to probe the future for indications of industrial glory. Since the commencement of milling in January, 1888, it has paid out \$29,530,000 in dividends and produced \$55,600,000 in gold, with its nearest competitor in the Simmer & Jack—larger but lower in grade—whose aggregate totals nearly \$40,000,000.

The wide significance of the resolved increase of capacity for the Robinson mill lies in the practical illustration it affords of the double benefit of decreasing costs—the obvious corresponding increased profits where grade can be maintained and the more vague augmentation of assets by the release of large blocks of low-grade reef, branded as unpayable in the less exacting days of financial prosperity.

The first placer claim in the Rampart region in Alaska was located and worked in 1896 on Little Minook creek by F. S. Langford, though gold had been previously discovered by John Minook, a Russian half-breed, who seems to have sluiced out a small amount of gold, and for whom the creek was named. Some prospecting had probably been done along Minook creek a number of years before.

## Machines and Tools in France.

BY GODFREY L. CARREN.\*

I understand that all former holdings of the General Electric Company in France have been acquired by the Thomson-Houston firm, and that a working agreement exists which withdraws the General Electric Co. and the Allgemeine Electricitäts Gesellschaft from competition with the Thomson-Houston firm on French territory. At the same time all new designs, plans, and developments are exchanged freely between the three firms above mentioned. The arrangement leaves only French Westinghouse as an American competitor with Thomson-Houston in France.

A visit to the Thomson-Houston Paris shops disclosed that some of the equipment was manufactured by the following firms:

The Fellows Gear Shaper Co., Springfield, Vt. (gear cutters); Norton Grinding Tool Co., Worcester, Mass. (grinding machines); F. E. Reed Co., Worcester, Mass. (vertical multiple drills); Whitcomb Manufacturing Co., Massachusetts (planers); Bullard Machine Tool Co., Bridgeport, Conn. (boring mills); Springfield Manufacturing Co., Bridgeport, Conn. (grinders); Pratt & Whitney, Hartford, Conn. (lathes and measuring machines); Whitney Manufacturing Co., Hartford, Conn. (milling machines); Browne & Sharpe, Providence, R. I. (turret lathes, grinders, and milling machines); Potter & Johnston Machine Co., Pawtucket, R. I. (automatic turret, chucking, and turning machines); Niles-Bement-Pond, New York (boring mills); Garven Machine Tool Co., New York (millers); E. W. Bliss Co., Brooklyn (stamp machines); Manning, Maxwell & Moore, New York (lathes, F. E. Reed type); Ferracute Machine Co., Bridgeton, N. J. (stamping machine); Newton Machine Tool Co., Philadelphia, Pa. (portable vertical planers, portable horizontal boring and milling machines, and rotary planers); Meadville Vise Co., Meadville, Pa. (horizontal boring machines for boring out motor tram boxes); Landis Machine Tool Co., Waynesboro, Pa. (grinding machines); Detrick & Harvey Machine Co., Baltimore, Md. (open-side planer); American Tool Works, Cincinnati (planers, millers, and lathes); Davis & Egan Machine Tool Co., Cincinnati (drill presses); Dresser Machine Tool Co., Cincinnati (radial drills); G. A. Gray Co., Cincinnati (vertical drill presses); J. A. Fay & Co., Cincinnati (woodworking machine); Fosdick & Halloway Machine Tool Co., Cincinnati (radial drill); Ingersoll Milling Machine Co., Rockford Ill. (vertical milling and planing machine); Morton Manufacturing Co., Muskegon Heights, Mich. (key-seating machines); Gisholt Machine Tool Co., Madison, Wis. (turret lathes).

The gas furnaces used in the establishment are from the American Gas Furnaces Co., of Elizabeth, N. J. The Potter & Johnston machines are spoken of highly, and the Gisholt lathes are well liked. There is a Landis grinding ma-

chine installed in these shops having a length of 3,920 millimeters. I was informed that a Landis 5-meter, long, open-bed machine is installed in the branch shops of this company at Lesquin, near Lille, France. There is a good installation of Bullard machines here, and for the most part they represent the latest designs of that firm. These Bullard machines are highly praised. The latest machine acquired from the Bullard Co. was put down on the Thomson-Houston floor. I was informed, for about \$3,000. I found about 10 machines from the Ferracute Machine Co.

Practically all the drive in the Thomson-Houston shops is electric. In many cases the tools are independently driven by motors directly attached. I observed a large Curtis turbine in process of construction, the last to be completed in the Thomson-Houston works, by whom the Curtis turbine is being pushed in French territory. Its competitors are the Zoelly, the Parsons, and Rateau.

The opinion was expressed that Brown & Sharpe tools in general, the Cincinnati Milling Machine Tool Co. millers, Pratt & Whitney lathes, and Bullard boring mills are unexcelled in their classes by European tools.

My attention was called to a lot of malleable iron gear covers for tram use, which had been ordered from a Buffalo, N. Y., firm. It would seem as if malleable iron is little understood in Europe.

## British Lead Trade.

During the six months ending with June the imports of lead into Great Britain were 117,512 long tons, as against 85,235 tons for the corresponding period last year; showing an increase of 22,277 tons or about 25%. Of this year's imports Spain supplied 52,311 tons, as against 53,366 tons in 1907; Australia, 29,638 tons against 25,620 tons; the United States, 20,201 tons against 7,297 tons; while the remainder came from various other countries.

Exports of lead for the half-year were 27,703 tons, as against 25,807 tons for the same period in 1907; an increase of 1,896 tons, or nearly 8%. Of this year's exports Russia received 7,339 tons against 5,760 tons in 1907; France, 2,549 tons against 1,339 tons; British India, 2,935 tons against 2,481 tons; China (including Hong Kong), 1,881 tons against 1,864 tons; Japan, 1,985 tons against 2,391 tons; Canada, 1,944 tons against 3,003 tons; while the remainder went to a number of other countries.

**Mineral Output of Formosa.**—For the year 1907 the mineral production of Formosa was as follows: Gold, 39,331 fine ozs., valued at \$812,977; silver, 17,136 ozs., \$11,311; copper, 47 long tons, \$14,398; coal, 134,180 tons, \$229,772; sulphur, 1,305 tons, \$14,922; kerosene oil, 241,080 gals., \$29,083. Compared with the previous year, increases are shown in silver, copper (1907 being the first year of copper production), coal, sulphur and kerosene oil.

Japan imported \$3,423,565 worth of machinery last year.

\*U. S. special agent at Paris, Worcester, Mass. (lathes); Baush Machine



# Notes on Southern Oregon as Prospecting Field.

By DENNIS H. STOVALL.

Harris brothers, two professional prospectors, who came into southern Oregon last February, have since cleaned up over \$30,000. This gold they mortgaged by hand from the rich stuff extracted from the surface of their prospects. William Berry, another professional prospector, has cleaned up about \$5,000 in the same time from this district.

These are only two instances out of many which might be given, which prove that southern Oregon offers abundant opportunity for success to the professional prospector.

This district has long borne a most unenviable reputation in regard to its being a country of pockets and gash veins. The purpose of this article is not to enter any protest against these false reports, but to give a brief summary of what southern Oregon offers as a prospecting field.

The climatic and topographical conditions in southern Oregon are such as to make it peculiarly favorable for the prospector. The mountains are not ragged nor steep as compared with those of other sections of the mineral northwest.

They are all well timbered and the abundance of streams insures the comfort of the prospector during the hot months.

The winters are mild, and the almost entire absence of snow, except on the higher ranges, allows the prospector to remain in the open the entire year. It is a fact that the quartz veins of southern Oregon are free-milling in character with remarkably rich exposures in the oxidized portions of the surface. This makes them especially valuable to the man of small means, as no other capital is necessary than that required for a grubstake and to fit up the pack.

The two men above mentioned have never been in southern Oregon before, but they had prospected in other fields and had a thorough understanding of the prospector's art. The district they selected is one of the oldest in the state, and had been mined and scratched over for the past 60 years, yet they unearthed a fortune where others had failed to find it. It was because they knew their business.

The mineral district known as the southern Oregon mining region, embraces the territory lying between the California line on the south and the Calapoosia mountains on the north; between the foothills of the Cascades on the east and the Pacific ocean on the west. On the east or around and about the base of Mt. Pitt, are the modern representatives of the basaltic lavas which disfigure a large portion of this section. Further down the slope is a gigantic glacial moraine, which covers many square miles with its debris.

Still westward are thick sandstones, relics of an age later than the Mesozoic, which cover up all of the auriferous rocks and effectually check all explorations for wealth in that immediate territory. Basalt abounds in this particular section, the most of it belonging to the

*Profits that have been made in prospecting, and the conditions that make possible successful work. Climate and topography are favorable to the prospector.*

*Geology and peculiar occurrence of gold. Rich strikes due to "pocket" nature of gold deposits.*

great continental deposits which in the middle of the Tertiary are said to have covered this portion with a molten and lurid sea of lava. But down on the lower hills, and further westward and northward, where the action of the water of the several rivers and streams has worn away the basalt, is found the main prospecting region of the district. This is a hospitable region, the most of it being evergreen and lying at an elevation of from 1,000 to 3,000 ft.

The rocks of this district are tilted

occupied, which was probably thousands of years, the fauna and flora of the upper valley sprang into existence. A large portion of the valley is covered with detritus, made up of waterworn rock, fragments of various sizes and various origins, mostly volcanic, but many sedimentary.

The country farther north is very mountainous, some of the summits reaching 5,000 ft. above sea level. This is in the northern part of Josephine county and the southern portion of Douglas county. The elevations lie in roughly parallel ranges whose directions are east and west, and includes between them the drainage basins of Jump-off-Joe, Louisa, Grave, Wolf, Coyote, and Cow creeks! and the south Umpqua river with its various tributaries. The main portion of this district belongs to Josephine county. The Southern Pacific railroad passes directly through it. This is a splendid prospecting field. Here is found some of the largest and richest quartz mines in the state, among them being the Greenback and Gold Bug and others. The



Southern Oregon Prospectors Ready for the Trail.

up at every imaginary angle, and are devoid of fossils as far as known. Slate formations predominate. A stratum of crystalline limestone, immense in area, crops out at four different points. This material is quite pure, and is being burned for lime, producing a milk-white article.

Gold Hill, which is one of the best prospecting districts in southern Oregon, marks the lowest limit of Rogue river valley, and below it the mountains close in and confine the stream to narrow canyons the remainder of its course to the sea. The valley above seems once to have held a fresh water lake, as is suggested by relics found there. It is possible to explain the existence of this lake by assuming that the granite outburst at Gold Hill took place after the valley was carved out to its present shape. This outburst dammed the waters of the river and compelled them to cut through the dike. In the time thus

geological formations are chiefly metamorphic slate and quartzite. Denudation has been very extensive in all this region, cutting canyons 2,000 ft. deep, and carving out valleys and mountains from what appears to have been a great elevated plateau.

Summed up, it may be stated that the vein matter of southern Oregon ledges varies little throughout a wide extent of country. One prominent geologist states that, taken as a whole, it may be described as hard, white, and compact quartz, carrying metallic sulphides with gold and silver.

The metallic sulphides consist of sulphurets, copper pyrites, and arsenical iron, and galena or lead sulphide. A typical southern Oregon quartz vein would have a thickness of from 2 to 10 ft. with a dip of 70 degs. Its walls would be very smooth and regular. There would be a soft, sticky gouge at least 1 in. thick. The sulphides present, which



would not constitute 1% of the vein matter, would assay, when carefully concentrated, about \$250 per ton.

The free gold is found in rich spots and bunches; and it is this peculiar characteristic that has given southern Oregon the name of being "pockety." As these bunches are invariably found in the veins, and are more numerous in the oxidized portions of the ledge, the prospector is sure to strike it rich with only a small amount of development. This accounts for prospecting in southern Oregon being known as "pocket hunting."

### Machines and Tools in Switzerland.

The firm which electrified the Simplot tunnel railway was Brown, Boveri & Co., of Baden.

The American tools observed were from the following makers: Ingersoll Milling Machine Co., Rockford, Ill. (milling machines); Brown & Sharpe, Providence, R. I. (millers); Cincinnati Milling Machine Co., Cincinnati, O. (millers); Norton Grinding Co., Worcester, Mass. (grinders); G. A. Gray Co., Cincinnati, O. (planers); Whitcomb Machine-Tool Co., Worcester, Mass. (planers); Mark Flatner Planer Co., Nashua, N. H. (planers); Warner & Swasey, Cleveland, O. (hexagonal turret lathes); Ilendy Machine Tool Co., Torrington, Conn. (shapers); Putnam Machine Tool Co., Pittsfield, Mass. (drill press); Baker Brothers, Toledo, O. (shaper); Baush Machine-Tool Company, Springfield, Mass. (drills); Gisholt Machine Tool Co., Madison, Wis. (turret lathes); Lodge & Shipley, Cincinnati, O. (engine lathes); Acme Machine Co., Cleveland, O. (automatic turret lathes).

The shop efficiency at Brown, Boveri & Co.'s is very noticeable, and it is believed that the technical administration is equal to that of the best shops of Europe. The machine tool management is similar to what one is accustomed to see in America, and it is an interesting fact that the superintendent in the machine tool department worked at one time in the Pratt & Whitney shops in Hartford, Conn. It is known that these works obtain the full working possibilities out of nearly all the American tools, and attention has been called to a Gisholt turret lathe which was turning out some pulley work at a cost of 60 cents (11.5 cents) for each pulley, as against 3 francs (58 cents) when this work was previously done on an ordinary lathe.

The Warner & Swasey hexagonal lathe is in high favor in the shops, and its possibilities seem to be well understood. There is not a tool in the American list that is not well spoken of, and it is the current opinion that any American tool possessing high merit will receive ready consideration by Brown, Boveri & Co. American chucks are bought, Pratt & Whitney measuring tools are used, and the tool hands work to micrometers.

The quantity of copper smelted in Russia from January to April, inclusive, was equivalent to 12,221,892 lbs., which is 2,402,640 lbs., or 21½% more than last year.

### Sampling of Silver-Cobalt Ores.

BY ARTHUR A. COLE.\*

There are few ores that present greater difficulty in sampling than the silver-cobalt ores of Cobalt. The ore consists generally of cobalt and nickel arsenides and sulphides, but the trouble is caused by the occurrence of large amounts of metallics composed of native silver, or an alloy of silver and arsenic, which acts in the mill the same as native silver.

The ore leaves the mine in heavy jute sacks containing about 100 lbs. each, and is shipped to Copper Cliff, Ont., in railway box cars under seal. In the case of very low-grade material no bags are used, and the ore is shipped in bulk.

From the car it is trucked to the weighing scale, where it is weighed in lots of 20 sacks, and the first gross weight obtained. The sacks are then opened and the ore passed through a large Buchanan jaw crusher. The empty sacks are tied up, weighed, and returned to the shipper. If the ore is dry it is shovelled directly into the ball mill. If it is wet it is spread on steam drying plates until it is dry, and then it too goes to the ball mill.

As the ore comes from the jaw crusher a small shovel from each sackful is set aside for a preliminary moisture sample, representing moisture contained in the ore as shipped. This moisture sample is coned and quartered to about 100 lbs., after which it is taken to the sampling room, where it is passed through a small Allis-Chalmers laboratory jaw crusher. Then it is cut down to four samples of 5 kgs. (11 lbs.) each, which are placed in pans in a steam oven, for about 20 hours, at a temperature of about 80 degs. C. This material eventually returns to the crushing floor and goes through the ball mill.

The ball mill is of Allis-Chalmers make and requires 25 h.p. It consists of a large metallic cylinder which revolves horizontally, and is lined with three sets of screens, the finest which is 20-mesh, being farthest from the center. The grinding is done by a large number of hardened steel balls, of a total weight of 1½ tons, which are carried up the side of the cylinder as it revolves, and then drop back on the ore. As the ore is ground to 20-mesh it is discharged below to an automatic sampler. Screen tests show that 50% of the milled ore will pass a 100-mesh sieve, and 80% 50-mesh. The capacity of the mill is about 1½ tons per hour.

The large metallics remain in the ball mill, and after the run is complete, they are removed, weighed, melted in a furnace and run into bars of bullion. The scales and the slag from this are combined and sampled together, while the bullion is sampled separately.

The automatic sampler, which is a 27-in. Snyder, cuts out one-tenth of the milled product. It consists merely of a circular casting shaped much like a miner's gold pan, having four openings in its sloping flange, and revolving on the end of a horizontal shaft. Two opposite openings are closed, thus leaving two cuts per revolution. The material to be sampled is directed by a spout so as to fall

inside of the sloping flange of the sampler. The rejections slide off the flange and the sample drops through the openings as they pass under the spout. The sample makes 25 revolutions per minute, and this gives 3,000 cuts per hour, for about 1½ tons of ore, or one cut for every pound of ore, or 60,000 cuts per car of 20 tons. A chain drive prevents slipping so that the cuts are regular.

The main part of the milled product (about nine-tenths of the whole), is here weighed and then passes to the storage bins of the smelter.

The sample is now removed from the sample chamber and weighed, and this weight is added to that of the milled product above. Payment is made on these combined weights, less the moisture.

Two complete weighings of the shipment are thus made which should agree closely. This gives the shipper a check on his weights. Thus the gross weight of ore in sacks should be the same as the weight of (a) milled ore including sample; (b) sacks, and (c) water lost on drying plates.

A sample for the final determination of moisture is taken by tube sampler from each paulful as it is removed from the sample chamber. This moisture sample is cut down to three samples of 3 kgs. (6.6 lbs.) each. The result thus obtained is used in the calculation of dry weight. The weight of water lost on the drying plates can be calculated by taking the difference between this and the first moisture result.

The main sample is now thrown on the concrete floor of the sample room, and after being shovelled over twice, is coned and quartered into two halves called sample No. 1 and sample No. 2. These samples are treated alike so that a description of one will suffice for both.

Sample No. 1 is coned and quartered by shovelling on the concrete floor down to about 100 lbs., which will be four or five cuts according to the size of the original sample. Cutting down is continued by halving in a Jones sampler till two samples of approximately 20 lbs. each are obtained. One of these is placed in a box and sealed by the shipper's agent for future reference, in case any accident should happen to the other samples. The other sample is now dried thoroughly and ground in a Sturtevant laboratory disc grinder till the fines pass through a 100-mesh sieve leaving the metallic scales on the sieve bright and clean. Part of the final grinding is sometimes assisted by a laboratory pebble mill of the Abbe Engineering Co., and sometimes by a Hance dry mill manufactured by Hance Bros. & White.

The metallic scales and fines are weighed and sampled separately. The fines are placed in a pebble mill and mixed for an hour before sampling.

Sample No. 2 is handled as above excepting that no reference sample is retained.

The methods of sampling as described above according to exceedingly good practice, and the final samples should be about as close to the truth as it is possible to get them.

It requires three days to complete the sampling of a 30-ton car.

\*Abstract of paper read before Canadian Mg. Inst., March, 1908.

# Gold: Its History and Economic Development.-I.

By EVANS W. BUSKETT.

*Metallurgical Engineer.*

Gold is probably the oldest of the metals, having been known as far back in the past as history reaches. That gold was one of the first metals used by man is probably due to the fact that it occurs in nature in the metallic state; that its color is attractive, and that it is easily worked into crude ornaments by hammering. The metal has always been highly prized because of its beautiful yellow color, which remains untarnished in all climates, and its rarity. The lowest orders of civilized man possess gold ornaments and these were often the cause of ancient wars.

Gold was used as coin in Greece in the nineteenth century B. C. Most of the gold at this period came from India, and it is probable that it was used for coin in that country at a much earlier date. Gold was known in Egypt nearly 4,000 B. C.

Cadmus, a Phœnician, mined gold in Thrace in 1394 B. C. The Phœnicians also worked placer mines in Tartessus, about 1100 B. C. The expedition of Jason and his Argonauts was piratical for the purpose of acquiring gold; this occurred about 1263 B. C. They rowed along the coasts of the Aegean, Propontine and Euxine seas to Colchis.

The Golden Fleece were probably the skins that were laid in the troughs to catch the gold.

The Spanish gold and silver mines were the cause of the fall of Carthage. These mines were owned by the Carthaginians and worked extensively by slave labor. About 220 B. C. Hannibal carried war into the territory claimed by Rome for the purpose of obtaining more gold mines. Rome retaliated, and the succeeding wars resulted in the complete destruction of Carthage.

Caesar's conquest of Gaul was also made for the purpose of acquiring gold mines.

The voyage of Columbus which resulted in the settlement and development of the Western Hemisphere was made to discover a shorter route to India whereby the gold and treasure of the East could be more readily obtained. Columbus did not discover the route to India, but a good substitute was found in the treasures of Mexico, which was plundered by Cortez, and shiploads of gold were sent to Spain.

The first mention of gold in the United States was in 1539, by Ponce de Leon, the discoverer of Florida. This was followed by accounts of various Spanish writers and explorers, some of them even describing methods used by the Indians in gathering gold. It is probable, however, that these accounts are largely mythical, and that the only gold procured by the Spaniards was from the natives who found it in the form of nuggets and had no regular process of recovering the metal.

The earliest authentic record of gold in the United States is by Thomas Jefferson, in 1782. In that year a piece of

*Gold as money and ornament. Early adventurers and warriors who sort the precious metal. Ancient mining. Discovery in America.*

*Influence of gold production on population. Unique properties of metal. Value as an alloy. Sources of supply and varieties of gold ore.*

ore was found on the Rappahannock river in Virginia, which yielded 17 dwts. of gold.

In 1799 a nugget was found at the Reed mine, Carrabass county, N. C. This state produced over \$100,000 in gold from 1801 to 1827.

In South Carolina deposits were worked in Chesterfield and Lancaster counties in 1829.

Gold was discovered in Georgia in 1829 in Habersham county. There was quite a rush to the new discovery, but the excitement soon died out.

Mining has continued in this region up to the present time. The discovery of gold in California and the Civil war were two crises from which southern gold mining has never entirely recovered. At present, however, there is a great deal of successful development work being done in this region.

Gold was discovered in California in 1848. This caused a rush, which resulted in the settling of the Pacific coast and the development of the whole west.

Gold was found in Australia in 1851, which materially aided in the settling of that country.

## PROPERTIES OF GOLD.

Gold is a bright, yellow metal when in mass, but the presence of other metals changes its color, silver making it lighter, while copper reddens it. By transmitted light gold is green. Molten gold is also green, and the vapor of the metal is supposed to be of the same color.

The most prominent properties of gold aside from its brilliant color and resistance to oxidation are its extreme malleability and ductility. It may be beaten into leaves 1/300,000 in. thickness, and one grain of gold can be drawn into a wire 500 ft. long. A single strand of this wire can hardly be seen by the naked eye.

The hardness of gold is 2.5 to 3.0 Thermal conductivity, 103 (Despretz, silver equals 100). Electrical conductivity, 76.7 (silver equals 100). Tensile strength 14,000 lbs. per sq. in. Elongation, 30.8%. The presence of impurities greatly lowers these constants. The presence of bismuth to the extent of 1/2,000 part renders gold so brittle that it may be ground to a powder in a mortar.

The specific gravity of gold precipitated by oxalic acid is 19.49, while that

of the cast metal is 19.29 to 19.37. Gold precipitated by ferrous sulphate may have a specific gravity as high as 20.72.

The specific heat of gold varies from 0.0316 to 0.0324. Gold melts at 1061.7 degs. C., its latent heat of fusion being 16.3.

Gold has a valence of 1 and 3. Its atomic weight is 197.2; atomic volume, 10.2. It is insoluble in any of the mineral acids, but readily dissolves in a mixture of hydrochloric and nitric acids. For this reason the mixture has been called aqua regia. It is also soluble in other mixtures which evolve nascent chlorine, and in a mixture of hot sulphuric acid to which a little nitric acid has been added. It is precipitated from the last solution by diluting with water.

Cyanides, bromides and chlorides dissolve gold, the cyanides being used extensively for the recovery of the metal on a commercial scale.

Gold alloys with nearly all of the other metals, its principal alloys being with mercury, silver, copper, and aluminum. Mercury forms the most important alloy, which is called amalgam, and by means of which large quantities of gold are extracted from the ores.

Gold and silver alloy in all proportions, forming alloys that are harder than either metal alone. Gold and copper form alloys that are harder than gold, and for this reason copper is added to gold used in the manufacture of jewelry and in coinage money.

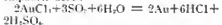
Aluminum alloys with gold in several proportions, some of these alloys having the properties of chemical compounds. They range in color from white to yellowish green and purple.

Gold forms two series of chemical compounds having a valence of 1 and 3.

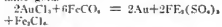
Monochloride, aurous chloride (AuCl), is a yellow amorphous powder easily decomposed. Decomposed by water.

Auro-trichloride (AuCl<sub>3</sub>) in color is red and can be decomposed by the addition of water into gold and AuCl.

Trichloride, auric-chloride (AuCl<sub>3</sub>), is a red salt soluble in water, alcohol, or ether. Readily decomposed by heat above 165 degs. Decomposed by light. Zinc and iron precipitate metallic gold. Hydrogen sulphide precipitates gold sulphide. Sulphur dioxide precipitates metallic gold with the formation of hydrochloric and sulphuric acids.



Ferrous sulphate also precipitates metallic gold.



Gold forms bromides and iodides similar to the chlorides, but more unstable.

Aurous cyanide (AuCy) is a crystalline yellow powder, insoluble in water, but soluble in ammonia, alkaline cyanides, and hyposulphite of soda. Insoluble in acids, but soluble in aqua regia. Decomposed by heat.

Aurocyanide of potassium (KAuCy<sub>2</sub>)

is slightly soluble in water. Gold precipitated by metals.

Auricyanide ( $\text{AuCy}_2\text{KCy}$ ) is decomposed by heat, forming aurocyanide.

Gold forms oxides, sulphides, hyposulphides, silicates and sulphides.

Purple of cassius was discovered by Cassius of Leyden, in 1683. It is formed when a solution of stannous chloride containing stannic chloride is added to a solution with gold chloride. It has a beautiful purple color, and is used to detect small quantities of gold. It contains gold and oxide of tin. The gold is supposed to be in a finely divided allotropic form. In the arts it is used to color glass and porcelain.

#### OCCURRENCE.

Gold occurs in the eastern states along the Appalachian range. Nearly all of the states west of the Mississippi river contain gold, but some are not producers. Gold is also found in paying quantities in Canada and Mexico.

The following states and territories of the United States are producers:

Alabama, Alaska, Arizona, California, Colorado, Georgia, Idaho, Iowa, Maryland, Michigan, Minnesota, Montana, Nevada, New Mexico, North Carolina, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Vermont, Washington and Wyoming.

Gold occurs in the metallic state and as tellurides.

Free gold can be extracted by amalgamation with mercury. It occurs in two general forms—placer and quartz gold. In the past placer gold was found in very rich deposits and was extracted by washing. At present placers are very low-grade and have to be worked on a large scale, using hydraulic giants, dredges, etc., in order to make them pay.

Quartz gold occurs in veins of quartz fissures in the earth. Gold sometimes occurs in the metallic state, and often free, in the sulphides of lead, zinc, iron and silver.

The principal telluride of gold is sylvanite. It crystallizes in the monoclinic system and is brittle; luster, metallic; color, steel gray; streak, steel gray; hardness, 1.5 to 2.0; specific gravity, 7.9 to 8.3. ( $\text{AuAg}$ )  $\text{Te}$ —tellurium, 62.1%; gold, 24.5%; silver, 13.4%.

Calaverite: color, bronze yellow; hardness, 2.5; specific gravity, 9.041.  $\text{AuTe}_2$ —tellurium, 55.5%; gold, 44.5%.

Gold in the free state can be readily determined by panning. It can be distinguished by its characteristic yellow color and its insolubility in acids.

Melted with soda on charcoal gold forms a yellow malleable button.

Gold in sulphide ores may be detected by first panning off the gangue and melting the concentrates with soda on charcoal. When the mass is thoroughly fused it is allowed to cool and is then cut off the charcoal with a knife and ground in an agate mortar. Water is added and the ground charcoal washed off. If there is an appreciable amount of gold in the ore there will be several colors of it in the mortar.

#### QUALITATIVE DETERMINATION.

Gold is precipitated from solution by

hydrogen sulphide in group II. It is insoluble in ammonium sulphide, which places it in the same division as tin, etc. There are, however, some distinguishing tests by which gold may be detected by precipitating with hydrogen sulphide.

The ore to be tested is dissolved in a mixture of nitric and hydrochloric acids and evaporated to dryness, but not baked. Water will dissolve the gold chloride, and a solution of stannous chloride is added. If there is any gold present there will be a brilliant purple precipitate (purple of cassius).

Ferrous sulphate added to a solution containing gold will precipitate gold in a metallic form. It can then be dried and melted into a button with soda on charcoal.

#### QUANTITATIVE ESTIMATION.

The quantity of gold in ores and smelter products is determined by assay. This is itself an art and cannot be treated at length in this paper.

The process consists of melting the ore with litharge ( $\text{PbO}$ ) and suitable fluxes. The fluxes vary greatly with the character of the ore and must be determined by the assayer. The molten fluxes dissolve the gangue of the ore, while the lead reduced from the litharge alloys with the gold and settles to the bottom of the crucible.

When thoroughly melted the charge is poured into a mold and when cool the lead button is separated from the slag and beaten into a cube. This button is then placed in a bone ash cupel and oxidized in a muffled furnace, the oxidized lead sinking into the cupel and leaving the gold and silver.

This gold and silver button is weighed and the silver separated by dissolving it in nitric acid. The gold is then washed and weighed and the silver determined by the difference in weight of the two.

#### Prices Paid for Cobalt Ores.

When it is learned that over 80% of the 14,851 tons of ore shipped from the Cobalt district in Ontario last year came to the United States for treatment, there is some curiosity to learn what prices were obtained from the smelting works.

In his report to the Temiskaming & Northern Ontario Railway Commissioner, Mr. Cole gave some interesting facts. Investigations show that most of the Cobalt ores are consigned to the Perth Amboy works of the American Smelting and Refining Co.

At the close of last year, the American Smelting and Refining Co.'s schedule for ores assaying under 1,500 ozs. silver per ton was as follows:

**Silver.**—Pay for 93% of the silver contents at the New York quotations as given by Handy & Harman to Western Union Telegraph Co. on the 30th day after agreement of assays.

**Working Charge.**—Nine dollars per ton of 2,000 lbs., dry weight, plus 0.5 cent per ton of each ounce of silver contained.

**Arsenic.**—Should arsenic be contained in excess of 5%, an addition to the working charge will be made at the rate of

25 cents per dry ton for each per cent of arsenic in excess of 5%.

**Insoluble Matter.**—An addition to the working charge will be made at the rate of 7 cents per dry ton for each per cent of insoluble matter contained in excess of iron.

Payments of net proceeds of shipments will be made on the 30th day after date of agreement of assays.

Ores assaying 1,500 ozs. per ton or over will be treated at the Perth Amboy plant by the cupelling process, separately from any other ores, in the presence of the shipper's representative, making payment immediately on production, for all of the silver recovered in silver bars at the New York quotation prevailing on date of production of bars.

All byproducts recovered during the process, such as slags, test buttons, etc., will be sampled in the presence of the seller's representative, and 98% of the silver contents of same will be paid for on the basis of assays arrived at by averaging the smelter's results with those of the seller's representative, providing the differences are not unusual; payment being made on the 30th day after date of agreement of assay and at the quotation prevailing on that date; any unusual differences in assays to be adjusted by tamping in the usual manner.

The working charge is \$125 per ton of 2,000 lbs. of ore, dry weight, plus 1% per oz. of silver paid for.

On ores running under 1,500 and above 400 ozs. per ton the shipper is advised to consign through Ledoux & Co.'s works at Bergen Junction, with privilege of sampling in transit. At any sampling or other operations at Perth Amboy plant the seller is entitled to have a representative present.

The freight rate on ore from Cobalt to Perth Amboy, N. J., is \$10.20 per ton.

Some of the comparatively low-grade ores proved suitable for mixing with certain western ores, and for this reason towards the end of the year a considerable tonnage of these ores was shipped to the American Smelting and Refining Co.'s works at Denver, Colo. A reduction was made in the smelting charge to offset the increase in freight rates.

Other buyers of silver-cobalt ores last year were the Balbach Smelting and Refining Co., of Newark, N. J., the United States Smelting, Refining and Mining Co., Chrome, N. J., and the Pennsylvania Smelting Co., Carnegie, Pa.

**Sicilian Sulphur Exports.**—During May the exports of sulphur from Sicily, according to Messrs. Emil Fog & Sons of Messina, were 30,485 long tons, of which 1,550 tons were for the United States. For the five months ending with May the exports totaled 207,179 tons, as against 174,327 tons in 1907; an increase of 32,852 tons, or nearly 19%. Stocks at Sicilian ports on May 31 were 527,798 tons, which compare with 503,359 tons a year ago.

From the island of Thermania, Greece, there was exported in 1907 iron ore to the amount of 30,750 long tons, as against 32,910 tons in 1906.

# Making Zinc-Lead White at Canyon City.

## EDITORIAL CORRESPONDENCE.

Most of the lead and copper ores of the Rocky mountain region contain varying quantities of gold and silver, and standard smelting methods have long been in vogue by which these metals are recovered and refined. Such ores usually contain considerable percentages of zinc.

With lead ores, the presence of some zinc is almost invariable, and in the case of copper ores small percentages of zinc are commonly present, and large percentages frequently so. This zinc content, which if reduced to a metallic state would be exceedingly valuable, is one of the greatest obstacles to ordinary smelting practice. The reason for this is that no smelting method has yet been devised whereby zinc can be satisfactorily reduced and collected simultaneously

*Western smelters penalize zinc in lead, copper or gold and silver ores. The United States Smelting Co. utilizes western zinc-lead ores, after concentration, for making a high-grade pigment.*

*Loss of precious metals at the oxide works is minimized by the patented process employed. Construction of furnaces. Uses of zinc-lead white.*

lowered to volatilize and its elimination attained in this way, then the losses of the other metals, more particularly the

and is still customary for the western smelters not only to make no allowance for zinc present in ores it purchases or treats on toll, but on the contrary to charge heavy penalties in addition to the regular smelting charges for each per cent of zinc present above a fixed limit of low percentage.

The conditions and facts above outlined have rendered it impossible until recently to treat successfully or profitably enormous tonnages of what are known as "low-grade complex ores."

Occasionally zinc ores are encountered in which the percentage of zinc is sufficiently high to be of greater value than the other metallic contents, and such ores are usually sold to zinc smelters for the manufacture of spelter, the precious metal contents being either partially or



General View of Zinc-Lead White Works, Canyon City, Colo.

with either lead or copper, and in ordinary methods of smelting, for lead or copper, whatever zinc happens to be present in the ores is entirely lost.

The loss of the zinc, in itself a serious matter, is not of so much importance as the difficulty of getting rid of it. All substances entering into a smelting furnace charge must either be reduced and collected as bullion, melted to a fluid slag which will run to waste, or, as is the case with coke or other forms of fuel, burned to gases which escape freely.

As above stated, it is impossible to collect the zinc as bullion in the ordinary type of lead or copper furnaces, because it is so volatile that it vaporizes at the heat necessary to the proper operation of the furnace. If the zinc is al-

precious metals, become so serious as to reduce profits greatly and in many cases render operations entirely unprofitable.

In consequence of these conditions, there is only one course left for the smelter operator to pursue, which is so to arrange furnace methods that the zinc present will be converted to oxide in the furnace and absorbed and carried away in the worthless slag. Zinc, in any form, however, has an annoying disinclination to enter into the composition of a readily fusible slag in any considerable quantity, so that the operation of a furnace where zinc is present is seriously retarded, to say nothing of the losses of itself and other metals and the additional cost of slag making material and fuel necessary.

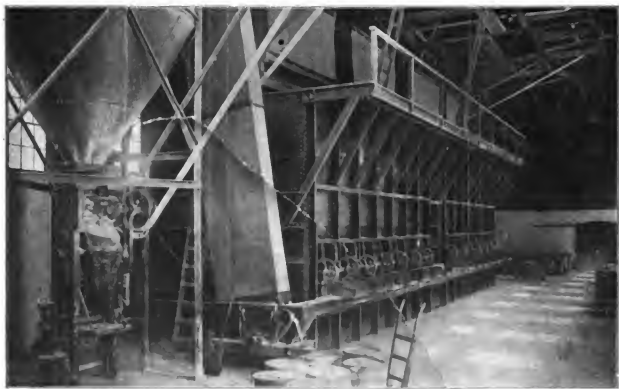
For these reasons it has always been

wholly disregarded and lost. Commonly, however, the zinc bearing ores of the mountain regions do not contain a sufficiently high percentage of zinc to be desirable for spelter manufacture, as other ores richer in zinc and consequently more profitable to smelt are still available in many parts of the country.

It was for the treatment of such low-grade and at that time valueless ores as have been roughly described, that the process in use at Canyon City, Colo., was devised and a small plant constructed 12 years ago. Since then both the process and works have been elaborated and improved upon until at the present time the United States Smelting Co. enjoys a prominent and well known position among the metallurgical institutions of



Interior of Roaster Room, Showing Zinc Furnaces at Canyon City, Colo.



Bottling Machinery, Refined Paint Bins and Barrelling Machine at Canyon City, Colo.

the west, and its pigment product made from zinc-lead ores and known as standard zinc-lead white is used in large quantities in every city of importance in the United States, Canada and Mexico, where mixed paints are manufactured.

The ores utilized are what are known as western zinc-lead ores, all of which contain varying amounts of gold, silver and copper and carry high percentages of combined zinc and lead, in fact much higher than the ordinary straight lead or zinc ores.

Owing to the various new and improved methods of concentration and electrical separation, practically all the ores are first treated by one or both of the above methods, producing a clean concentrate from which has been removed practically all foreign matter, leaving only clean lead and zinc product containing the precious metal values.

The metallurgical practice at these works is in many ways the reverse of ordinary methods, in that the extraction of the zinc and lead contents of the ores is undertaken as the first step, leaving a copper, gold, and silver bearing residue, which can then be smelted in the regular way, thus avoiding troublesome effects incident to the presence of zinc and obviating the necessity of a subsequent separation of lead and copper in the bullion.

In the process employed for this purpose, which is fully protected by letters patent, the lead and zinc are volatilized and driven off together in the form of vapors in specially designed furnaces and by novel and ingenious methods designed to produce a pigment containing the necessary proportions of zinc and lead, and at the same time minimize the losses of the precious metals in the process of separating zinc and lead from them by volatilization.

It is well known that zinc oxide is produced by volatilization of metallic zinc or of zinc from its ores, and the oxidation of the vapors while hot by contact with the air. It is also a familiar fact that when galena or native lead sulphide is heated or volatilized in contact with air, it takes up oxygen and is converted into lead sulphate. It is further known that zinc oxide and lead sulphate are among the more permanent pigments available to the painting industry.

When the zinc and lead from ores containing both elements are oxidized together, it has been found that there is an intricate reaction and readjustment of the constituents, resulting in an entirely new compound, which is neither zinc oxide nor lead sulphate, but a molecular union of the two, having the qualities of both, but differing considerably from either.

The process of manufacturing standard zinc-lead white begins with the analysis of the ores to ascertain their proportional content of metallic zinc and lead. They are then crushed and screened by suitable machinery, and the comminuted materials are mixed, also by machinery, in proportions that will yield the proper relative proportions of zinc and lead compounds in the product. The ore is now ready for charging, together with a sufficient quantity of fuel coal to

maintain combustion, into the volatilizing and oxidizing furnaces.

These furnaces, devised specially for the purpose, are so constructed as to admit air to the incandescent mass of ore and fuel on the grates in proper supply and from all sides. The zinc and lead present are reduced to the metallic state and converted to other volatile forms, but on reaching these conditions are instantly vaporized and drawn by means of exhaust fans into combustion cham-

ber, where the chemical transformation of the product, due to oxidation, completes itself.

Then the white fume passes forward through a series of long cooling flues to suspended wooden collecting bags, from which the waste gases of combustion escape, while the pigment is retained.

The white pigment, as it collects in quantity, is removed from these bags and carried to the finishing furnaces, where on open hearths the crude prod-

uct is further oxidized, condensed in bulk, desulphurized and whitened to the standard color. Finally, the finished product is bolted through the fine cloth on vibrating screening appliances and then packed automatically for shipment.

The residues in the volatilizing furnace retaining the copper, gold and silver contained in the original ores, are further smelted with other crude ores in special blast furnaces, the resulting product being a copper matte or base copper



Under Bins in Bag-House at Zinc-Lead White Plant, Canyon City, Colo.

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Standard zinc-lead white, as thus perfected, is a molecular combination of zinc oxide, lead sulphate and small proportions of lead carbonate, lead oxysulphate or basic lead sulphate. The combination being effected at a high temperature while the metals are in the form

bullion which dissolves or absorbs and retains the gold and silver originally present and from which they are readily separable by well known refining processes.

Standard zinc-lead white, as thus perfected, is a molecular combination of zinc oxide, lead sulphate and small proportions of lead carbonate, lead oxysulphate or basic lead sulphate. The combination being effected at a high temperature while the metals are in the form

of vapor, the union is far more intimate than anything that could be attained by grinding together the separate component pigments.

The very fact that the lead content is in the form of sulphate and contains no hydrated or unstable salts, it is not effected by sulphuretted hydrogen or other sulphurous derivatives, and all its components being chemically stable it has no injurious effects upon the oil with which it is combined. On this account, paints containing it show no tendency to chalk, peel or become transparent.

The uses of this pigment are practically the same as those of any other white paint base. It may be used alone as a base for paste, or ready mixed paints.

### Free Gold in the Cyanide Process.

BY DUNCAN SIMPSON.\*

Oil and lime can act as deterrents to the dissolution of free gold by cyanide solution; but owing to their interference with the uniformity of the results of some work in which I was engaged on the Witwatersrand, I was impressed by their possible importance as such, in cases of low extraction that were otherwise inexplicable.

In one pronounced case, when the sand contained 29 grs. of gold per ton no

\*Paper read before British Inst. of Mng. and Met., Feb. 26, 1908.  
longer amenable to cyanide, it was found possible by laboratory treatment to reduce this residual gold by further cyaniding to 13 grs. per ton, both deterrents being present. The sample containing 29 grs. to the ton was washed with water several times to insure the absence of dissolved gold, and one portion (a) was repeatedly washed with ether, and another portion (b) with dilute hydrochloric acid. By evaporation of the washings from (a) a substance was recovered resembling vaseline in appearance, and "touch lime" was found in the washings from (b).

Further treatment with cyanide solution now reduced (a) to 15 to 17 grs. per ton, but (b) only to 27 grs. per ton. On treating, after thorough water washing, (a) with dilute hydrochloric acid (b) with ether, and again dosing them with cyanide solution (0.25% KCy), both were reduced to 12 to 13 grs. per ton. The oil film had resisted removal by the working cyanide solution (0.15 to 0.05% KCy) during the treatment period of about six days.

Prolonged aeration by circulation in the pumps was effective in preventing the precipitation of carbonate of lime to any excessive amount in the leaching tanks, and a threat of dismissal for the mill hands on its repetition prevented the further leakage of bearing oil into the cyanide works.

Imports of spelter into Great Britain for the first half of this year amounted to 45,018 long tons, as against 45,218 tons for the corresponding period in 1907, and 43,843 tons in 1906.

Tennessee exported 10,211 tons of phosphate rock through Pensacola, Fla., in May.

### Varieties and Occurrences of Mica.

BY D. R. STERRETT.\*

The name mica is given to a group of minerals which have certain physical properties in common. Prominent among these are ready cleavage, whereby the minerals can be split into extremely thin sheets, and the flexibility and elasticity of these sheets and their comparative softness, which is combined with a certain toughness.

These properties, along with the others, such as the occurrence of plates or blocks producing sheets several square inches in cross section, light color, transparency, nonconductivity of electricity, and resistance to heat, render certain varieties of mica of great value in the industrial world. The two varieties largely used are muscovite, or potash mica, and phlogopite, or magnesia mica. Other varieties, for which there are limited uses or no use at all in their natural state are biotite, a black or dark brown iron-magnesia mica; lepidolite, or lithia mica, used principally as a source of lithia or as an ornamental stone; roscoelite, or vanadium mica, used as a source of vanadium; paragonite, soda mica; zinnwaldite, or iron-lithia mica.

Muscovite, phlogopite and biotite are practically the only varieties which occur in quantity and in sheets of sufficient size to be of commercial value, though biotite is rarely if ever industrially applied. Muscovite is slightly harder and more brittle than phlogopite, though generally lighter in color. Muscovite may be white, gray, yellow inclining to amber, brown, red or green in color. Brown and red muscovite, when of the proper shades, are often called "rum" and "ruby" mica. Phlogopite may be silvery gray, yellow, brown, or black, and some varieties present a coppery appearance. The trade name of phlogopite is "amber" mica.

The muscovite mica of commerce is obtained only from pegmatite in regions of crystalline metamorphic or igneous rocks. Pegmatite is a very coarse textured rock whose composition is closely allied to that of granite, into which it sometimes grades.

The minerals composing pegmatite are feldspar and quartz in varying proportions with or without mica and other accessory minerals. The minerals of pegmatite are crystallized out in large masses, some specimens showing a typical coarse granitic texture, or in vein-like bands or irregular segregations. Some individual crystals of feldspar measure several yards in length, mica also occurs in crystals several feet in dimensions. Of the numerous accessory minerals found in pegmatite—some very rare—certain ones are of value. These are the rare earth minerals, or various gem minerals, as tourmaline, beryl, spodumene, garnet, etc. It is not unusual to obtain some of these minerals with the mica. Thus, in North Carolina gem aquamarine, blue beryl and specimen material have been found in the mica mines.

\*Extract from Mineral Resources of U. S. for 1907.

In South Dakota the same pegmatite has yielded mica, cassiterite and columbite.

Pegmatites valuable for their mica contents are generally found in metamorphic gneisses and schists, in which they occupy various positions. In some occurrences the pegmatites follow the bedding planes of the country rock for considerable distances; in others they cut the strike of the enclosing rock through part or all of their action. Many pegmatite masses are very irregular in shape and continuity, and some exhibit the same structures as the country rock.

Pegmatite that is commercially valuable for mica commonly occurs in overlapping lenticular shaped bodies and sheets of more persistent extent. The deposits range from a fraction of an inch up to many yards in thickness, and the length of the lens shaped masses may be from two or three times to more than times their thickness.

The minimum thickness of a pegmatite body which can be profitably worked for mica might be arbitrarily placed at from 1 to 2 ft. for rich and regular veins.

The mica crystals occupy various positions in pegmatite masses, and no positive rule can be made for finding them. Where the pegmatite has a typical granitic texture, the mica may be found evenly distributed through it. Often the larger crystals will be found either in clusters at intervals through the "vein," in places partly connected by streaks of small crystals, or along one or both walls of the pegmatite. Where there is a quartz streak within the pegmatite, the mica occurs on either or both sides of it, being partly embedded in the quartz or occupying any of the positions noted above in the remaining portion of the pegmatite.

Commercially valuable deposits of phlogopite are not known to occur in the United States. Deposits carrying commercial sizes of muscovite mica have been found in Alabama, Arizona, California, Colorado, Connecticut, Georgia, Idaho, Maine, Maryland, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, South Carolina, South Dakota, Virginia, Wyoming and a few other states.

### Free Lighterage on Export Shipments.

Many manufacturers who ship to foreign countries through New York forwarding concerns seem to be unaware of the "free lighterage" privilege which export freight shipped in carload lots enjoys. As a consequence of not seeing that their railroad billing to New York reads "lighterage free," many shippers have had to pay extra charges for cartage from the railroad to the steamship pier, which latter may be in Brooklyn or Hoboken, thus entailing extra ferriages also.

The "lighterage free" clause entitles the shipper to free delivery of carload lots alongside steamer or on steamer's dock at such piers as are usually employed by any of the ocean lines. On full carloads, made up of export shipments to go by different lines, one free delivery is allowed, extra deliveries being at the rates which became effective on Mar. 15, 1908.

# Method of Building Concrete a Coal Bin, Etc.

By ERNEST McCULLOUGH.

Civil Engineer.

The concrete coal bin described in The Mining World April 11 was left in the air, perched on columns, or on walls, as suited the builder. The walls around the bin had not been designed, so it consisted merely of a floor was a 6-ft. depth of slab. The assumption coal, weighing 60 lbs. per cu. ft. As this is a very low

pressure, it is easily disposed of if the wall is to be of reinforced concrete. If of plain concrete, it would require a thickness of 2 ft. at the bottom and about 8 ins. at the top. For a reinforced wall, the simple cantilever form will be alone considered.

An upright cantilever wall is figured the same as a horizontal cantilever beam, with this difference: the weight of the wall is neglected, whereas the weight of a horizontal beam must always be a part of the load. To calculate the pressure of the coal with a horizontal surface,  $P = 10d^2$ , in which  $P$  = pressure in pounds against a vertical strip 12 ins. wide, and  $d$  = depth in feet.

To obtain the bending moment at the bottom of the wall, the pressure must be applied at a point one-third up from the bottom, which is in this case 2 ft.  $M = 2 \times P$ , for  $P$  acts through the center of a gravity of a triangle, being zero at the top and attaining its full effect at the bottom.

For the wall,  $M = 10 \times 6 \times 6 \times 2 = 720$  ft. lbs. As the wall is to be a slab and the strip is 12 ins. wide, there is no necessity for multiplying by 12 to get inch-pounds. This gives us the following formula for thickness of the wall at the bottom:

$$d = \text{thickness} = \sqrt{\frac{720}{104}} = 2.6 \text{ ins.}$$

There should be about 1 in. of concrete outside the steel so the wall will be considered to be  $3\frac{1}{2}$  ins. thick.

The foregoing formula will be remembered as the beam formula in the last article, in which  $d$  is the effective depth of beam, or depth to center of steel.

To obtain the steel area for this wall and using 12½% of steel:  $A = 2.6$  ins.  $\times 12$  ins.  $\times 0.0125 = 0.39$  sq. ins. per 12 ins. in length of wall. It will be sufficient to place  $\frac{1}{2}$  in. square vertical bar every 7½ ins. apart.

The adhesion being considered as equal to 75 lbs. per sq. in. of imbedded surface, each linear inch of a  $\frac{1}{2}$  in. bar is equal to  $75 \times 2$ , or 150 lbs. The pressure every 8 ins. is only 240 lbs., so the imbedment of each rod for less than 2 ins. will give sufficient bond. Practically, however, on account of the difficulty in handling such bars with a short bend makes it advisable to insert the bars not less than 4 ins. in the floor.

*Formulas for calculating the pressure of coal; also the compression and tensile stresses of the walls and bottom of the bin.*

*How a cement structure is reinforced, and steel necessary for same. Building cantilever and retaining walls, water tanks and flumes.*

What is known as 3-in. mesh, 10-gage, double stranded expanded metal would do as well for the reinforcement.

The general method for walls is practically the same as the foregoing. These matters will now be taken up.

The wall may be designated as an antilever in which the bending moment is figured by first getting the pressure on a vertical 12-in. strip as above, and then multiplying the pressure by one-third the height of the wall.

Having the bending moment, the usual formula for depth of beam is taken to obtain thickness at the base. The top thickness should never be less than 6 ins., and can vary from the thickness found at the bottom to a top thickness of 6 ins. The reinforcement is all vertical and placed on the side towards the pressure, being covered by not less than 1 in. of concrete. The vertical rods must be turned at the bottom into the slab far enough to furnish bond. Instead of the floor at the bottom to which the wall is tied, there is a slab in ordinary retaining walls. The calculations connected with the base will be taken up later.

Instead of the cantilever wall a retaining wall may be designed as a series of panels, each tied to a counterfort. The pressure each counterfort has to sustain is obtained by finding the pressure, as already noted, then multiplying it by the number of feet from center to center of counterforts.

The counterforts are each designed as cantilevers and reinforced by rods along the inner edge. These cantilevers are usually 12 ins. to 18 ins. thick, or wide, and the thickness at the bottom from the front to back is found by the formula for  $d$ . The cantilevers run out to the top of the wall, being triangular in shape.

The slabs between the cantilever counterforts are figured as horizontal beams, but as they are resisting a side pressure, the weight of the beams is neglected. The pressure is found for each foot in depth and a beam calculated, but sometimes only the thickness at the bottom and at about one-third the depth from the top is found and the bar made straight, the steel being proportioned accordingly.

To ascertain general formulas, the following table of the value of a constant known as "y" is given:

Water ... .. 31.2

Fine dry sand .....	15.7
Dry loose gravel .....	12.5
Coal .....	10.0
Dry loose earth .....	9.9
Loose, natural earth .....	8.2
Moist earth .....	8.7

The pressure on a vertical strip 12 ins. wide is  $P = y \times d^2$ , and the pressure on a square foot at any depth,  $d$  is called  $w$  and is  $w = y \times (2d - 1)$ .

In a wall figured as a cantilever the reinforcement is vertical, and horizontal rods are run across to tie the vertical rods to and act as cross-binding rods, and also to assist in resisting temperature stresses. This horizontal steel is generally from one-fourth to one-third as much as the vertical steel.

In a wall figured as slabs tied to counterforts the reinforcement is horizontal and there are some vertical rods placed at regular intervals to assist in distributing the stresses. This vertical steel is equal in area to about one-fourth to one-third the horizontal steel.

The small  $w$  found, as shown in the last formula, is equivalent to the load considered on beams and floor slabs. To find the pressure therefore on each 12 ins. in height on the wall slabs, multiply  $w$  by the square of the clear span between counterforts and divide by 10 to get  $M$ . Having found  $M$ , use the formula for thickness already given, and then proportion the horizontal steel.

Multiplying  $w$  by the clear span gives the total weight or load on each 12-in. width. Dividing this by 2 gives the reaction on each counterfort and thus the pull which each rod must resist, and divided by 75 gives the number of square inches required for adhesion so the rods will not pull out. That is, it tells how many inches each rod must run, into the counterforts.

Sometimes the wall may be designed with counterforts at regular intervals with a beam along the top. The pressure on this beam will be one-third the pressure on a vertical 12-in. strip for each foot in length, which thus calls for the design of a beam having that much of a load uniformly distributed, in which the weight of the beam is neglected. This beam has a height of any selected amount and  $d$  is found as before. The beam is considered as lying on its side and the rods from the counterfort run into it far enough to furnish bond represented by one-third the total pressure against the counterforts.

With such a wall the reinforcement in the slabs is vertical. For each 12-in. vertical strip the steel reinforcement at the top runs into the beam to take care of one-third of  $P$  and at the bottom runs into the slab far enough to take care of two thirds of  $P$ . The usual cross bearing steel is provided. The vertical steel is proportioned to resist a moment as follows:

$$M = \frac{P \times d}{78}$$

when any material other than water is considered, and for water,  $M = 4 \times d^3$

The maximum bending moment is



about seven-twelfths down from the top, so the thickness of the slab will be uniform.

This latter method, considering a beam at the top of the wall, applies as well to walls around cellars and basements, where the bottom and top floors against which the walls rest represent the beam mentioned.

The writer had occasion within the past year to design a tank of a certain depth in which the area of the land covered was fixed and the capacity of the tanks fixed. A calculation showed that the walls could not be more than 12 ins. thick. Consequently, the pressure of water at the bottom was figured, and the thickness of the wall being taken as the depth of a beam, the greatest possible span was obtained.

Then at intervals counterforts were placed, but instead of being wider at the bottom than at the top, they were figured as beams standing vertically and carrying the wall slabs. These beams were also limited in size because of the tank capacity. So the design was made, and the greatest possible length each beam was good for under the pressures imposed was found and rods placed across the tank at required intervals to hold the beams.

To make it clearer, the tank was designed as a skeleton framework, having a top floor and a bottom floor with vertical beams, like columns at regular intervals, and these beams tied together through the tank with rods at intervals sufficient to make the short spans that the beams were found strong enough for. The slabs were reinforced horizontally, the steel running far enough into each beam to give bond. This was not a particularly economical design, but under the limitations imposed was the best that could be done.

A reinforced concrete wall must have a base wide enough to carry the weight without imposing too great pressure on the foundation, hence such walls are made in the form of a capital T or an inverted capital T. For a trial the base is generally assumed at about four-tenths the height.

The wall must be heavy enough to resist being pushed forward by the pressure, and the leg of the base in the rear must be so long that the earth on top of it forms practically part of the wall. Call the total weight of the earth on the slab, taken at 100 lbs. per cu. ft., plus the weight of the wall, taken at 125 lbs. per cu. ft.,  $W$ , which represents the weight in pounds.

The bending moment at the bottom of the wall has been already described,  $P = \frac{1}{2} W d$ .

The bending moment tending to break the rear leg of the slab from the wall is found by multiplying  $W$  by half the length of this leg. This gives data by which to figure the thickness of the bottom slab at the junction of the wall.

The thickness of the slab, however, is figured by assuming it as composed of a series of beams 12 ins. wide running from one counterfort to another. The steel from the counterforts is imbedded in the slab to take up two-thirds of  $P$ , and the steel in the slab runs into

the counterfort far enough to take up half the load on the slab. The load on each 12 ins. width is found by multiplying the clear span between counterforts by the weight of the earth on each width. This weight multiplied by the span and divided by 10 gives the bending moment by which to proportion the steel and find  $d$ .

The outer edge of the slab farthest from the wall must be designed for the full weight of the earth, but as the slab will revolve around the foot of the wall, as a fulcrum, the weight at the wall is zero. This leaves the thickness to be found to prevent breaking off at the wall line. The rods in the slab running parallel with the wall and turned up into counterforts will be spaced farther apart as they get closer to the wall.

Draw to scale a parallelogram having a height equal to the wall and a base, or width, equal to the assumed base. Through the center of gravity drop a vertical line representing to any scale the weight of the wall. Through this point draw a horizontal line to the same scale representing the pressure. Complete the parallelogram and draw the resultant. Call the distance from the point where this resultant cuts the base to the nearest extremity of the base  $d$ . Call the width of the base  $b$ .

The greatest pressure in pounds per square foot at the front toe of the wall is called  $F$ . Then

$$F = \left( \frac{b-d}{b \times d} \right) W$$

This is the maximum pressure it is figured the earth can stand. If too great then, the front toe can be lengthened or piles driven. In order that the maximum pressure on the base be not greater than twice the average, and that there be no tension on the back side of the foundation, the distance of the resultant from the middle point of the base must not exceed one-sixth the base.

The front projecting toe of the wall, which will, or should, be present, even with a wall designed like the capital T, is apt to be broken off, so the bending moment must be found. When the length of this toe is equal to one-half the base,  $M = \frac{1}{2} F \times (1 \frac{1}{2} \text{ length of toe})$ . When the toe is less than one-half the base,

$$M = (F - \frac{100}{2b} F) \cdot 1.61 \text{ toe}$$

where toe represents length of toe.

The places to put the steel will be understood when one remembers that in a cantilever beam the steel is placed on the side towards the pressure, while for supported beams the steel is placed on the side away from the pressure.

The rules and formulas given apply to water tanks rectangular in form, to the sides of bins as shown, to walls to retain any material, and also the sides of flumes. In fact, all the calculations already given should enable anyone to design beams, slabs and walls for any purpose.

For circular tanks the concrete is not figured to resist any pressure for the strain is all tension. It is usual to assume for the concrete a thickness of not less than 4 ins., and keep this for about

6 ft., then for deeper tanks assume a thickness at the bottom of one-half the number of inches the tank is deep in feet, sloping gradually to 4 ins. at a point 6 ft. from the top, and from that point up, maintaining that thickness.

The pressure is found by the formula  $w = y \times (2d - 1)$ , which is for a horizontal strip of 10 ins. at a depth  $d$ .

The area of steel for each 12 ins. width, horizontal, is found as follows:

$$A = \frac{w d}{f}$$

in which

$A$  = area of steel in square inches.

$w$  = pressure in pounds per square foot.

$d$  = internal diameter in inches.

$f$  = fiber stress per sq. inch in steel.

This formula is used also for pipes under pressure. It gives the steel rings, and there must be also longitudinal rods, as already explained for slabs, to land the reinforcement, preserve the intervals and take care of temperature stresses.

### Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

#### CANADIAN MINING INSTITUTE.

The Editor:

The summer excursion will afford to those participating in it, a quite exceptional opportunity of securing information from personal observation of the mineral resources of Canada, while the trip itself will undoubtedly be very interesting one. The Institute has invited the members of the several representative mining and engineering societies of Great Britain and other European countries to take part in the excursion, and a considerable attendance from abroad is now assured.

In the hope that some of our friends from the United States may wish to take advantage of this opportunity, the council of the Institute has directed me to request you to announce in your columns that members of sister societies in the United States will be privileged to participate in the excursion on the same terms as have been arranged for our own members.

Should any of your readers be interested in the project, I shall be happy to furnish them with full particulars.

H. MONTGOMERY LAME.

Secretary, Canadian Mining Institute

413 Dorchester street.

Montreal, Canada.

**New Caledonia Ore Exports.**—According to Le Bulletin du Commerce de Noumea, the exports of ores from New Caledonia for the four months ending with April, this year, were: Nickel, 27,517 metric tons; cobalt, 1,311 tons; copper, 2 tons; chrome, 5,944 tons.

Iron ore exports from the island of Seriphos, Greece, last year amounted to 173,320 long tons, as against 167,136 tons in 1906.

Phosphate shipments from Sfax, Tunis, for May amounted to 77,000 tons, making a total of 340,167 tons for the five months.

# Suggestions to Miners, Mill and Smelter Men.

It is bad practice and poor economy in shot-firing to shorten the fuse or not to use a fuse that will reach to the outside of the hole.

Ferro-chrome usually runs 60 to 68% chromium. It is graded per unit of chromium and per unit of carbon, the price increasing with the chromium and decreasing with the increase in carbon, these elements being guaranteed. If low in carbon, it is sometimes called "mild."

The absorption of gold by copper plates may be ignored by the mill-man in his estimates, as the average rate probably in no case exceeds the fraction of a grain to the ton milled, and, in the case of ore containing coarse gold, may be practically nil.

Ferro-molybdenum is sold per pound of pure molybdenum contained, regardless of the percentage of other material. Thus, if a pound of 80% ferro-molybdenum is purchased, 1¼ lbs. of the alloy will be received. A typical analysis, the units of molybdenum only guaranteed, is as follows: Molybdenum, 78.15%; iron, 17.55%; carbon, 3.24%; phosphorus, 0.028%; sulphur, 0.021%.

A vertical, short stroke piston type of pump with the cylinders separated has been found to do successful work in supplying water from a river or well where the water level fluctuates from time to time. The water cylinder can be placed below and the steam cylinder at the surface connected with the necessary rods and guides. This overcomes the inconvenience of having to go down into the river or well, also the cost per gallon for pumping the water is reduced.

Practical tests have demonstrated that an average condensing engine of standard type requires from 20 to 30 times the amount of feed-water for condensing purposes, or about 1 to 1½ gals. of condensing water per minute per indicated horsepower. It is necessary that the air pumps should be placed lower than the condenser. A good air pump and condenser should give 25 ins. of vacuum and make available about 10 lbs. more mean effective pressure with terminal pressure. A good condenser will have one-quarter of the fuel or increase the power of an engine one-fourth with the same amount of fuel.

The subject of laboratory magnetic separators is again attracting attention. In 'The Mining World' May 16 last appeared a description of an electro-magnet for testing the suitability of an ore for magnetic separation, which does satisfactory work. Some years ago Prof. Henry Louis made a similar apparatus, which may be described as follows: The magnet consisted of two straight limbs bolted to a stout cross-piece, which was slotted, so that the distance between the poles could be altered and the pole pieces moved. The windings were so arranged that the current could be sent through both, or through either limb, as required. By this arrangement the apparatus could be used

*Helpful hints, the result of practical experience in developing a mine and preparing the product for market.*

*Readers are invited to send in short articles describing the means by which they have overcome ordinary difficulties.*

for minerals of high susceptibility, by uncoupling the iron cross bar and using one limb only as an ordinary bar magnet with a wedge shaped pole piece. For minerals of low susceptibility both limbs and pole pieces were used. It may be noted that a laboratory separator of the same type as the apparatus of Prof. Louis and that described in 'The Mining World' is being manufactured abroad. This apparatus has a cross-belt for continuously discharging the magnetic concentrate, both the main carrying belt and the cross-belt being driven by a small electric motor. In Prof. Louis' machine a sheet of transparent celluloid is used below the pole pieces, and it is found to be very convenient.

Zinc dust is made by smelters as a by-product, being the fume or fine zinc that escapes from the condensers. It is sold in the form of dust. There is some zinc dust made in America, but by far the larger supply is produced in Germany. Its use has increased with its application in the cyanide process for precipitating gold from the solution. It is also used in paints and in other industries. It sells in large lots at about 85% of the price of spelter.

In calculating the haulage capacity of any locomotive or motor used in mines, the draw-bar pull should be divided by the sum total of the resistance, the resistance due to gravity and the resistance due to friction. For a level road, the resistance due to gravity is zero, and the resistance due to friction is on an average 15 lbs. per short ton, so that the hauling capacity of a motor would be the weight of the draw-bar pull divided by 15 tons. For a road having a grade of 1%, the hauling capacity of the motor is:  $D \div (15 + 20)$  tons; for 3% road it will become  $D \div (15 + 60)$  tons, etc. D is equal to the draw-bar pull.

The fact that many coals deteriorate, and some are liable to spontaneous combustion, when stored, has been the subject of widespread discussion. From recent observations it may be doubted whether pyrites, except when present in large amount, produces spontaneous combustion, though it seems that while pyrites does not fire when pure, it is liable to heat and take fire if mixed with organic matter, as in coal. Coal contains varying quantities of unsaturated compounds which rapidly absorb oxygen, thereby gaining in weight but deteriorating in coking properties and calorific value. Another series of compounds also occurs which take up oxygen, but give off carbonic acid and water in the process. The

latter process, which is usually slow, produces a loss in both the weight and value of the coal. A coal on storing therefore may gain, lose, or remain constant in weight, according to the quantities and relative proportions of the two classes of compounds present, but will almost invariably deteriorate in value. When coal is stored in a cool, dry place the aeration is, in most cases, inconsiderable. Moisture certainly assists in the oxidation of the coal. The effect of pyrites on spontaneous combustion is undoubtedly over-estimated. The value of ventilating stored coal is doubtful, as although ventilation will help in cooling, it will supply the oxygen necessary to produce combustion.

In making steam connections in an engine room, it must be remembered that by using a valve having an angle end, one joint in the pipe line is saved, besides less space is occupied by such a pipe than by an elbow and a straight valve. All valves should be tested to at least three times the working steam pressure, and they should be so made that the stuffing box can be repacked under pressure. The case rings should have double joints and should be heavy to permit their being unscrewed from the body and replaced after they have been ground to the gate rings. The body and cover flanges should be grooved to hold the packing. Rubber packing is usually used for gaskets.

When re-opening old colliery workings it is expedient to drive gangways parallel to the old gangways by taking a skip from the pillars as the old gangways are apt to be more or less caved and it would not pay to remove the caved material and re-timber them. The pillars between the breast can be recovered by driving narrow chambers or taking a skip on one side of the old breast. The chambers should be as narrow as practicable in order to avoid much timbering. When the face reaches the desired distance, then skipping the pillars should be extended to the full width of the pillars at the face, and when retreating the whole pillar may be recovered. It is good policy to leave a stump of 20 to 30 ft. of each pillar at the foot of the breast to protect the gangway.

In assaying, tellurium is removed comparatively slowly during cupellation, and if towards the end there is sufficient left to amount to anything approaching equality to the gold, or gold plus silver, then the surface tension of the globule breaks down completely and the alloy spreads over a wider area, "wets" the cupel and is completely absorbed. This occurs in the case of bone ash cupels when the tellurium in the button equals the gold, or gold plus silver, and the lead does not exceed 10 times the tellurium. When the lead exceeds this amount the behavior is intermediate between the extreme cases of complete absorption and perfect cupellation. Partial sub-division of the bead on the cupel then takes place. This has long been recognized as a possible occurrence when tellurium is present.

# Current Literature on Mining, Metallurgy, Etc.

**Mining and Transportation at Santa Eulalia, Mexico.** Claude T. Rice. Besides describing the methods of working the more important mines, reference is made to the wage question and prospecting.—E. & M. J., July 4, 1908; pp. 31-6; illus. 20 cents.

**Asbestos: Its Occurrence and Economic Value.** J. S. Diller. Describes the varieties and characteristics of asbestos, and its production and consumption in the United States.—Extract from Min. Res., in *The Mining World*, July 11, 1908; pp. 14%.

**Goldfield, Nevada.** T. A. Rickard. In this his sixth article, the writer describes the methods of transportation.—M. & S. P., July 4, 1908; pp. 24% ; illus. 20 cents.

**The Occurrence of Tungsten Ores in Canada.** T. L. Walker. Describes the geology of the deposits, and gives analyses of the ores.—Can. Mg. Jl., July 1, 1908; pp. 11-3. 30 cents.

**The Cost of Steam Power in Varying Units.** Wm. O. Welber. In discussing fully the power cost question on a fair and equitable basis, the writer has considered all items, and gives tabulated statements to illustrate his arguments.—Engrg. Mag., July 1908; pp. 5. 40 cents.

**Hydraulic Filling of Dam.** Donald F. Campbell. Describes the construction of a dam for a small reservoir of 2,900,000 gal. capacity.—M. & S. P., July 4, 1908; 300 words; illus. 20 cents.

**Phosphates.** Richard McMurtrie. Notes on producing and preparing phosphatic materials.—Am. Fert., June, 1908; pp. 54-4. 40 cents.

**The Cost of Producing Copper in Arizona.** James Ralph Finlay. Analyzes the costs of operating the properties of the Arizona Copper Co., Shannon Copper Co., and Calumet & Arizona Mining Co. The low cost per pound of copper in the four chief districts of Arizona is due to richness of ore rather than to favorable conditions.—E. & M. J., July 4, 1908; pp. 12-3; illus. 20 cents.

**The Estimation of Iron and Vanadium in the Presence of One Another.** Graham Edgar. Describes briefly the various methods of other investigators, and gives in detail the results of his own experiments.—Am. Jl. of Sci., July, 1908; pp. 3% 60 cents.

**The Origin of Coal.** H. M. Chance. Reviews the theories that suggest the origin of coal.—E. & M. J., July 4, 1908; pp. 12-3; 20 cents.

**El Rayo Gold Mine, Near Santa Barbara, Mexico.** Claude T. Rice. Describes the occurrence of ore, method of developing the mine and the milling practice.—E. & M. J., July 11, 1908; pp. 24% ; illus. 20 cents.

**The Estimation of Cerium in the Presence of the Other Rare Earths by the Action of Potassium Ferricyanide.** Philip E. Browning and Howard E. Palmer. The work described was undertaken to

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

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determine how completely the oxidation of cerium from the cerous to the ceric condition may be effected by potassium ferricyanide in alkaline solution, and how completely the measure of the oxidation can be registered in the amount of potassium ferrocyanide formed.—Am. Jl. of Sci., July, 1908; pp. 2. 60 cents.

**Production and Dividends of the Cobalt Mines.** Alex. Gray. Summarizes the output of silver, and describes the work done that has resulted in the distribution of large profits.—*The Mining World*, July 18, 1908; pp. 2.

**Recent Developments in Fire Protection Devices.** Gorham Dana. America stands first in the list of countries in the amount of property annually destroyed by fire, and it is natural, therefore, we should stand first in the modern crusade against this destructive element. Describes apparatus for extinguishing fires, and protecting buildings in other ways.—Tech. Quar., June, 1908; pp. 23; illus. \$1.

**Placer Mining on the California and Oregon Old Channels.** Dennis H. Stovall. Gives figures to show the productivity of the regions described.—Mg. Sci., July 19, 1908; 750 words. 20 cents.

**Fighting Fire in an Anthracite Coal Mine.** P. H. Devers. Describes the problems in timbering and ventilation that were encountered in extinguishing a fire in the Jersey colliery of the Delaware, Lackawanna & Western railroad in Pennsylvania. Also refers to the method of flushing with clay.—E. & M. J., July 11, 1908; pp. 31-6; illus. 20 cents.

**Manufacturing Candle Box Furniture for Mines.** Matt W. Alderson. Describes how candle boxes may be made into cabinets of drawers, bookcases, etc.—*The Mining World*, July 18, 1908; pp. 14% ; illus.

**Copper Smelting in Siberia.** William A. Heywood. Describes the practice at the Spassky works in the Akmolinsk district of Siberia. Two of the features of the Russian operations are remarkable, namely, smelting in brick blast furnaces with soft coal fuel, and the production of a slag very low in iron.—M. & S. P., July 11, 1908; 600 words. 20 cents.

**Colorado Fuel & Iron Co.'s Plant at Minnequa, Colo.** Geo. J. Bancroft. Continuation of a previous article. This part describes the method of handling the pig iron from the furnaces and the

operation of the rolling mill.—Mg. Sci., July 9, 1908; pp. 44% ; illus. 20 cents.

**The North Side of the Coeur d'Alene District.** Herbert S. Auerbach. Describes the geology and development of the mines, which include the Golden Chest and Coeur d'Alene placer.—E. & M. J., July 11, 1908; pp. 5% ; illus. 20 cents.

**Re-Arching Underground.** T. Wheatman. Describes the method employed at a coal mine in Great Britain.—Mg. Engrg., July, 1908; pp. 14% ; illus. 20 cents.

**Mining Prospects in Commonwealth of Australia.** John Plummer. Refers particularly to the development of the more important mines, and gives figures of production.—*The Mining World*, July 18, 1908; pp. 2; illus.

**The Heat of Fuels and Furnace Efficiency.** William D. Ennis. Defines heat; elements of commercial fuel; how chemical composition determines heating value, and considers other factors of combustion.—Power, July 14, 1908; pp. 4. 20 cents.

**Cyanide Costs.** A. R. Parsons. Gives figures showing the costs of precipitation and cleanup at the plant of the Desert Power & Mill Co., Millers, Nevada.—M. & S. P., July 11, 1908. 20 cents.

**Ore Contracts From the Smelter's Standpoint.** Clarence A. Grabill. Discusses the principles involved in calculating smelting costs.—E. & M. J., July 11, 1908; pp. 44% ; illus. 20 cents.

**Clays: Their Commercial and Artistic Products.** W. S. Ward. Describes the various kinds of clays for making brick, vases, etc.—Proc. Colo. Sci. Soc., June, 1908; pp. 10; illus. 60 cents.

**The Technique of Coal Mining.** George H. Winstanley. Continuation of a previous article. This part refers to the precautions to be taken in connection with the installation and working of electrical appliances in coal mines.—Mg. Engrg., July, 1908; pp. 24% . 20 cents.

**Goldfield, Nevada.** T. A. Rickard. In his seventh interesting chapter the writer discusses gold production and profits.—M. & S. P., July 11, 1908; pp. 3% ; illus. 20 cents.

**Employing Electric Power in Joplin District.** Doss Brittain. Describes the plant of the Spring River Power Co.—*The Mining World*, July 18, 1908; pp. 2; illus.

**The Manufacture and Use of Ferro Alloys.** John B. C. Kershaw. A discussion of the methods adopted abroad in connection with the electric furnace, and notes on the properties of the alloys.—Ir. Tr. Rev., July 16, 1908; pp. 64% ; illus. 20 cents.

**The Mines of Northwestern Altar, Sonora, Mexico.** George W. Maynard. Describes the climate, mining development, and prospects of the district.—E. & M. J., July 11, 1908; pp. 14% ; illus. 20 cents.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### Automatic Mine Car.

The Kilbourne & Jacobs Manufacturing Co. of Columbus, Ohio, has a new type automatic mine car on the market, which operates upon an entirely new principle. Its door operating device, while necessarily always effective, is like all practical devices, extremely simple. It is comprised of a rod, one end of which is pivoted to an eccentric locking cam, the opposite end being attached to the lock. The lock consists of a pivoted hook, whose pivot slides in a yoke having a curved bearing surface. When the door is locked, the pivot is within the yoke and the hook is held upright, while the locking cam is against the face of the turntable. On raising the car body to an angle of 7 to 8 degrees the locking cam is released and the weight of the load opens the door. The door is securely locked again by merely righting the car. This whole device is entirely beneath the car body so that it is protected from all danger of being damaged.

Among other important features, the durable construction of the door and the method by which it is attached, together

with the two parts, the oxide furnace and the blast furnace. In the former the concentrated ore is mixed with fine anthracite coal and charged into small furnaces where the zinc is driven off as oxide—the zinc white of the metallic paint manufacturer.

The residue is a clinker containing the iron 38%, manganese 11% and some unburned coal and zinc ore. This residue is passed over a screen and the coarse clinker treated in a blast furnace, producing spiegel, the iron-manganese constituent of manganese steel.

Since the starting of the plant the fine material from the screen has been waste. The fine coal and zinc were found to play havoc with the blast furnaces, eating out the linings and choking the throats with zinc oxide. After years of operation, the pile of waste became a mountain and the management began to figure on its disposal.

The Hancock jig makes a triple separation, that is, zinc ore containing 16 to 18% zinc oxide, for retreatment in the oxide furnaces, iron manganese clinker, running 40% iron and 14% manganese for treatment in the blast furnaces, and unburned coal, running 65% carbon, used in the oxide furnace charge. The only waste is 2% ash, which is carried with the overflow water into a settling tank. The water is settled and pumped back into the jig, about 20% being lost in each circulation.

The product handled by the jig is 15 tons per hour, or 360 tons per 24 hours, but it is capable of handling, if required, between 400 and 500 tons of material in 24 hours. The feed is the regular run of fines from the furnaces heated after a cooling period of six hours.

This machine is the regular 25 ft. size Hancock jig manufactured by the Allis-Chalmers Co., of Milwaukee, Wis.

### Trade Publications.

**Compressed Air Haulage.** H. K. Porter Co., Pittsburg, Pa. Pp. 81; illustrated.

This is a publication of unusual interest, presenting among other matters a brief review of the history of the company and its early connection with compressed air haulage. The advantages of using air haulage are set forth and a number of the installations are shown, now in successful operation. The book contains much very valuable data and will be mailed to readers of *The Mining World* on request.

**Gaskets.** Smooth-On Mfg. Co., Jersey City, N. J. Circular; illustrated.

Is devoted to the Smooth-On gaskets, which are covered with Smooth-On elastic iron cement, capable, it is claimed, of expanding and contracting like iron. A sample gasket will be sent by the company to any engineer sending his address.

**Engines.** Charter Gas Engine Co., Sterling, Ill. Folder and circulars; illustrated.

Is devoted to the company's gas, gasoline, kerosene and alcohol engines and

engines connected with electric dynamos. The circulars advocate portable gasolene engines and Charter double-acting pumps for deep well pumping and other purposes.

**Tube Mills.** J. R. Alsing Engineering Co., 136 Liberty street, New York city. Pamphlet; illustrated.

This volume describes the old type of pulverizing equipment and includes a brief description of the modern mills now made by this company. Some testimonials and references are given, together with cross-section drawings illustrating the descriptions.

**Railway Track Work.** The Indianapolis Switch & Frog Co., Springfield, O. Pp. 84; illustrated.

Shows a number of standard and special designs of track work, including crossings, frogs, switches, stands and accessories. Particular attention is called to the use of full section of rail instead of flat guard, as a method of guarding on tongue and switch construction.

**Core Drills.** The Cyclone Drill Co., Orrville, O. Pp. 82; illustrated.

Calls attention to chilled steel shot as an acceptable substitute for diamonds as the cutting agent of core drills. The company claims that its method has been practically demonstrated not only equal, but superior, especially in difficult, broken rock, to all other drilling methods. Both hand and steam power equipments are listed.

**Generating Sets.** B. F. Sturtevant Co., Hyde Park, Mass. Bulletin 156; illustrated.

This is devoted to Sturtevant generating sets for small power plants which are built in standard sizes from 150 to 500 kw., and consisting of vertical compound enclosed engines direct connected to 10-pole generators. A 400-kw. set is illustrated and parts of the apparatus are shown.

**Asbestos Wood.** H. W. Johns-Manville Co., 100 William street, New York city. Catalog No. 107; illustrated.

Advocates the substitution of asbestos wood for slate, marble or fiber. This is made principally from asbestos fiber and has the appearance of ordinary wood, although it is much harder and takes a higher polish. It is made in the shape of boards, shingles, etc., and can be used in construction work much the same as wood.

**Narrow Gauge Railways.** Arthur Koppel Co., Koppel, Pa. Pamphlet.

This is a reprint of an article published in a recent number of *Engineering* of London, England, describing the long est narrow gauge light railway in the world, which was constructed by the Arthur Koppel Co. in German Southwestern Africa. The road is 361 miles long and views of completed sections are given, together with sectional drawings of the rolling stock used.

**Foundry Equipment.** Whiting Foundry Equipment Co., Harvey, Ill. Pp. 32; illustrated.

This catalog covers a variety of machinery and apparatus, including cupolas, car dumping machines for charging cupolas,



Kilbourne-Jacobs Automatic Mine Car.

with the strength of the hinges, are prominent. The door is re-enforced at the top and bottom by strong bars and its side edges are flanged. The hinges consist of triangular gusset plates re-enforced at the point of pivot and working on individual hinge bolts. There is no rod across the car and no obstruction is offered by the hinge bolts either inside or outside of the car.

### Hancock Jig in a Triple Separation.

A recovery of 98% of a waste material in making three useful products is the remarkable record of the Hancock jig installed at the plant of the New Jersey Zinc Co. at Hazard, Pa.

The Hazard plant is furnished with ore from the mines at Franklin Furnace, N. J. These ores are complex, containing franklinite, willemite, zincite, etc., aggregating about 26% zinc oxide, when concentrated.

The process of treatment consists of

traveling and jib cranes, air hoists, tumblers for cleaning castings, ladles of all sizes, industrial railways and cars, an overhead trolley system, core ovens, etc. A partial list is given of plants equipped by this company.

### Industrial Notes.

The Wisconsin Metals Co., British Hollow, Wis., has been incorporated with \$60,000 capital stock. The incorporators are R. D. Durly, Charles Slater and Charles Rick.

The Chicago Concrete Machinery Co. has opened offices at 911 Rothschild building, Philadelphia, in charge of Henry T. Peirce, for the sale of its line of contractor's equipment.

The Lake Superior Iron & Metal Co., Ripley, Mich., has been incorporated with \$30,000 capital stock. The company was chartered for the purpose of engaging in a general merchandise business, buying and selling metals and railroad appliances.

The Filer & Stowell Co., Milwaukee, Wis., builder of heavy-duty Corliss engines, is now represented in Chicago and vicinity by Frank Engelhardt, with an office at 735 Marquette building. Mr. Engelhardt, with the exception of a short period, has been handling the Filer & Stowell engines for about 10 years.

Contracts for machinery and equipment for the plant of the Pittsburgh-Buffalo Coal Co., at Mariana, Washington county, Pennsylvania, have been awarded to the Westinghouse Electric & Manufacturing Co., and other Pittsburgh concerns. Delivery will be started within 30 days and work of installing the machinery will begin August 1. The work involves expenditures of about \$3,000,000.

In view of the increasing use of electricity in Mexico, Messrs. G. & O. Braniff & Co., who are the general representatives in that country for the Westinghouse Electric & Manufacturing Co., of Pittsburgh, Pa., are distributing among their customers large, illustrated placards, upon which are printed Dr. A. H. Goelt's instructions for resuscitating persons who have suffered an electric shock. These placards are printed in Spanish and English and are intended to be placed in generating or sub-stations, or wherever high voltage electricity is employed. A thorough understanding of these instructions and a careful observance at time of accident may be the cause of saving many lives. Within the last few days a case has gone on record at a mining property in Mexico of a man having received a heavy charge from a 33,000-volt transmission circuit, being brought back to consciousness and ultimate recovery after more than two hours' tireless application of these rules, which tends to confirm the belief that few cases of electric shocks are necessarily fatal, unless the victim dies later from the effect of burns. These instruction cards Messrs. G. & O. Braniff & Co. will furnish upon application to parties in Mexico who are users of electricity.

### Personal.

John D. Ryan of Butte, Mont., visited the iron ranges of Minnesota last week.

Seelye W. Mudd has completed an examination of a Cripple Creek property.

Colonel Epes Randolph has resigned as a director of the Green Cananea Copper Co.

A. E. Place of Place & Elton, Oaxaca, Mex., is on a visit to various cities in the United States.

W. B. Morris has been appointed superintendent of the Lucky Boy Mining Co., Hawthorne, Nev.

D. F. Sprouse has been appointed manager of the Waldorf Metals Co., with properties near Georgetown, Colo.

Arturo Butner, manager of the Santa Catarina Mining Co., Oaxaca, Mex., is in Boston, Mass., on company business.

C. K. Leith, professor of geology in the University of Wisconsin, recently visited the Cayuna iron range in Minnesota.

Austin H. Brown, late manager of the Trinity Copper Co.'s interests on the Pacific coast, will reside in Berkeley, Cal.

S. H. Kenniston, manager of the Dan Creek Gold & Copper Mining Co., Valdez, Alaska, is in Helena, Mont., recently.

Charles Gifford, superintendent of the Moose Horn mine in the Cobalt district, Ontario, was in New York city recently.

J. A. Manurd has been appointed manager of the Eureka Gold Mining Co., with property at Penon Blanco, Durango, Mexico.

F. E. Atteux, of Boston, Mass., president of the Marietta Mines Co., recently inspected the company's property at Mina, Nev.

E. A. Collins, superintendent of the Montana-Tonopah Mining Co., has returned to Tonopah, Nev., from his European trip.

Louis S. Cates, mine manager for the Boston Cons. Copper & Gold Mining Co., has returned to Salt Lake, Utah, from a visit to Alaska.

A. I. De Haff has opened an engineering and assay office at Metairie, Wash. Mr. De Haff is a graduate of the Columbia School of Mines.

E. L. White, president of the Bingham Cons. Mining Co., has returned to Boston, Mass., from a visit to the company's property at Bingham, Utah.

Dwight E. Woodbridge of Duluth, Minn., is making an examination of the property of the Calumet & Montana Mining Co., in Beaverhead county, Montana.

George Oakum, general manager of the Great Republic Mining & Milling Co., with properties near Prescott, Ariz., has been conferring with officials of the company in Pittsburgh, Pa.

J. Parke Channing was at the mines of the Tennessee Copper Co. last week. From there he went to Globe, Ariz., to look after the property of the Miami Copper Co., for which company he is consulting engineer.

J. E. Masters has been appointed manager of the Silver City Mining & Milling Co., of Silver City, Idaho. Mr. Masters

will, however, continue as manager of the Potosi Mining & Milling Co., with property in the same section of Owyhee county, Idaho.

W. P. Hammon, the Oroville dredge operator, was in Redding, Shasta county, Cal., recently, accompanied by Lewis Aubrey, state mineralogist of California.

T. R. Drummond is now in charge as manager of the Cactus mine at Newhouse, Utah. Mr. Drummond was formerly manager of the Dominion Copper Co. in British Columbia, and up to a month ago was manager of the Nipissing property in Cobalt, Ont.

Horace V. Winchell has resigned his position as chief geologist for the Great Northern Railway Co. and is again practicing his profession. As in the past he will pay special attention to copper and iron ore mines and mining litigation with offices in Minneapolis, Minn.

### Obituary.

George D. Potter, of Spokane, Wash., a well known mining man in the Pacific northwest, died recently in Seattle.

Samuel C. Cook, foreman of the zinc extraction mill of the American Zinc Extraction Co., died last week at Leadville, Colo., at the age of 35.

Carl Lunkenheimer, first vice-president of the Lunkenheimer Co., Cincinnati, died recently at Pasadena, Cal. He had been in ill health for several years, and had resided for the most part in California. The funeral will be held in Cincinnati.

Frederick S. Harris, consulting mining engineer of Goldfield, Nev., died of typhoid fever in San Diego, Cal., on July 17. He was born in Chicago, Oct. 22, 1859, and was well known in mining circles throughout the United States and Mexico.

### Technical Schools and Societies.

**Bituminous Mine Foremen's and Fire-bosses' Association.**—This association has been formed with headquarters at Barnesboro, Pa. John Hayes, Carroltown, Pa., is secretary.

**University of Utah.**—According to the university's latest catalog, this institution, located at Salt Lake City, reports 190 students in the School of Mines. A new building 144 by 62 ft. has recently been added, and is well supplied with milling and smelting machinery, and an assay room with all necessary appliances.

**Western University of Pennsylvania.**—The School of Mines of this university at Pittsburgh has issued its 1908 catalog. A number of courses are shown which permits a wide range of subjects to be chosen by candidates for the degree of mining engineer and metallurgical engineer. In addition to the regular courses, special or partial courses are provided, especially intended for men who have had practical experience in mining, and desire to fit themselves for positions as foremen, superintendents, etc. The school has been thoroughly reorganized and its teaching facilities much enlarged.

# Late News From The World's Mining Camps.

## ARIZONA.

By STAFF CORRESPONDENTS.

### Phoenix.

The Two Queens mine at Winkelman, Pima county, is in good ore, and the mine is now at a big producing stage. Part of a recent large order of machinery for the mine has arrived. Two 8-hour shifts are at work.

The Interstate Gold Co., in Black Rock district, Yavapai county, has a big force of miners at work pushing ahead the drifts, in the faces of which there is 3½ ft. of ore. One of the drifts is now in 22 ft., the vein being continuous the entire distance. The company's holdings consist of four claims, covering what was once the town of Gilbert.

The Hale Mining & Development Co., also in this district, is successfully pushing development work. The present work comprises the opening of the ledge by drifts from the lower levels. There is good ore in all the breasts where work is being done.

It is reported that on the Four Metals mine in the Mowry district, Santa Cruz county, the ore body has been cut over 50 ft. in the Red Hill tunnel and that no lancing wall has yet been reached. A \$50,000 concentrator is contemplated.

A 35-ton car of gold-copper ore running better than 15% copper and \$11 in gold to the ton was shipped to the El Paso smelter from the Little Butte mine five miles west of Bouse, Yuma county, this week. The shipment was 65% iron, which gave it a low treatment charge. This property belongs to McMahon & Bouse. There is from 16 to 20 tons of the same quality of ore still on the dump.

Fleming & Morro, whose properties are 25 miles north of Bouse, have received returns of 4% copper and 9 ozs. gold to the ton from a test shipment made to the sampling works at Prescott, and are shipping 15 tons of the same grade of ore to the El Paso smelter.

Kimball & Goodie are working the Old Maid mine in the district under lease.

### Prescott.

It is believed that, after years of search, one of the ledges in Crook canyon has been located from which is washed the rich float always found in the bed of the canyon after heavy rains. The discovery was made by John Burris, a prospector who, after long search, found a narrow cropping resembling in every particular a piece of float picked up five days before. He has gone into the mountain about 25 ft. and now has a pay streak 10 ins. wide running hundreds of dollars to the ton. The find is located one-half mile south of the old Crook mine. Crook canyon gave up lots of placer gold in the late sixties and early seventies. The Burris find has caused a big revival in that section, which is only 14 miles southwest of Prescott.

R. M. Hanson is here making arrangements to resume work on the Cooley group, one-half a mile west of the Burris camp. In one of Hanson's claims some very high-grade ore is exposed and capital has been secured for extensive development work.

County Assessor T. A. Campbell has re-

turned from Jerome, where he superintended the installation of a new electric light plant for the Hayes Copper Co., of which he is the general manager. The plant is now furnishing light for the entire camp and the mine down to the 700 level. Mr. Campbell reports a wonderful revival in the past month in the whole Verde district. The United Verde smelters are running full blast.

At the Bullwhacker claim three miles east of Prescott high-grade rock is still being piled on the dumps, which now contain over 200 tons which will average \$150 to the ton. The property is unfortunately tied up with leases, subleases and an attachment. It may be months before affairs are straightened out so that the mine can be developed. The 200 tons of rock has been taken out by two men since December last.

The 10-stamp mill of the Elliott Cons. Mines Co. at Chaparral is running steadily and regular shipments of bullion and concentrates are being made. The present rate of concentrate shipment is two cars per month. Sinking will soon be resumed in the 400-ft. shaft and a 10-drift air compressor will be installed. It is the intention next fall to replace the present 10-stamp mill with one of 40 stamps weighing 1,000 lbs. each.

The Emporia mine, seven miles south of Prescott, has recently been sold to a New York syndicate. A new 2-compartment shaft is being sunk on the property. After a depth of 400 ft. has been reached drifting will be commenced. New hoisting machinery will be installed.

The Green Mountain group of mines, situated in Copper Creek district, 10 miles south of Prescott, has been sold to a syndicate composed mainly of New York men. The property has a shaft 230 ft. deep and several hundred feet of drifts, in one of which is a large deposit of copper.

## CALIFORNIA.

### San Bernardino.

The Carbonate, Fortuna, Fortunatus and Carbonate Extension claims in Cliff canyon in the New York mountains, this county, have been purchased by a Mr. Dean of Los Angeles and eastern associates. Two miners are at work on the Carbonate and in 90 ft. found ore that is being sacked and packed two miles to the Salt Lake railroad at Brant. The Garavanza Mining & Milling Co.'s road is being extended one-half mile farther to the Carbonate claim for the purpose of shipping ores to the Garavanza mill for concentration and for sending in supplies.

Messrs. Cole, Walton and House have acquired several groups of claims a few miles from the Garavanza properties and have made arrangements to begin work at once on two 200-ft. shafts.

H. M. Banfield is still working the Garavanza mill and making high-grade concentrates. He is also working several

men on his Chloride lease, from which he is preparing another shipment for the Needles smelter.

The Washburn Mining & Milling Co. has put two men at work sinking on its group. An 8-ft. vein of \$13 ore has been opened up, which will be concentrated in the Garavanza mill.

The California Homestake Mining & Milling Co. is purchasing equipment preparatory to operating its Surprise and Silver Wedge groups on a large scale.

The Inter State Mining & Reduction Co. has already shipped powder, coal and groceries, etc., to Brant station and will put a large force of men at work on its 2,000-ft. tunnel.

Preparations are being made for the blowing in of the Balakala smelter. At the mine a large force of men is handling the ores and the bins of both the Trinity and Balakala companies are being filled. When the smelter starts up in the fall it will have an ore reserve second to none in the copper belt of this state.

The Bully Hill Co. is shipping large quantities of matte to the Mammoth converters.

Gold mining in northern California has been given impetus by the increased production of the Gladstone mine at which 30 stamps are dropping on very rich ore. The monthly brick amounted to over \$30,000.

### Chico.

The White Lily property in Plumas county on the west fork of the Feather river is developed by tunnels. At the present time 20 men are employed. A large body of \$6 gold ore has been opened up at places 60 ft. in width. A further battery of 20 stamps has been purchased and will be added to the six stamps in use for the last two years. It is understood that about 85% of the values are saved by amalgamation. The property has produced \$100,000 and since the ownership passed two years ago to the Seneca Mining & Milling Co. of Los Angeles, it has been brought to a dividend paying basis.

### Los Angeles.

The old Alvord mine 23 miles northeast of Daguerre has been leased by Kenneth K. Ash of Los Angeles. The ledge which contains the gold is from 200 to 500 ft. wide and has been proven up for a distance of two miles. In the center of the ledge are veins and stringers with values in gold of about \$5 to the ton. It is one of the best of low-grade propositions, the ore being quarried out rather than mined. On the property is a 6-stamp mill and ore is run to it by gravity. New buildings, stamps and a new 4-drill air compressor are soon to be added. The fuel used is oil and water in sufficient quantity is obtained from a well 400 ft. deep.

## COLORADO.

### Denver.

The Hampton Cons. Mines Co., operating in the Russell Gulch district near Willis Gulch, is getting ready for a plant of

machinery in order to sink and open up this ground on a more extensive scale. The Hampton recently shipped two carloads of ore averaging from \$33.71 to \$37.54 to the ton, taken from a depth of less than 150 ft. in the shaft. The property has a record of over 2,000 tons, averaging \$25.83 to the ton, taken from the Hampton vein, from the surface to a depth of 150 ft. The shaft is now down 225 ft., and it is proposed to sink another lift and crosscut in order to open the seven veins that outcrop on the surface. This action was decided upon on account of the recent rich strikes made upon the Star of the West, which enters the Hampton ground on the northeast side, and by the phenomenally rich strike on the War Dance claim. The War Dance vein enters the Hampton claim from the southeast and has recently been opened up on the surface of the Hampton claim. This vein will be crosscut from the lower level of the Hampton, which was run a distance of over 600 ft., in the slope of the hill in the direction of the War Dance, giving a depth of approximately 350 ft. Oliver O. App of Denver and eastern people have recently become interested in this property.

The War Dance is being worked by leasers who are keeping the production and the amount of ore blocked out as quiet as possible on account of internal difficulties. This property was practically idle for nearly 30 years, the reason being that the ore being flourent and sylvanite, did not show free gold while panning and was, therefore, considered worthless by former operators. The rich grade of the ore was discovered by a test made by Percy Alswork, secretary of the chamber of commerce at Central City. This rich find, together with the rich strikes on the Cook and the Fiske properties, belonging to the Fifty Gold Mines Co., showing wire gold of high values, has created quite a stir in the Gilpin district and many of the old properties have begun working again.

A streak of ore, averaging from 3 1/2 to 5 ft. in width has been opened up on the Saratoga mine at the Newhouse tunnel level. Those runs from \$1,600.00 to \$1,900 per car.

At the Anchor mine, in the Willis gulch in Russell district, operated by the Hearne Gold & Copper Mines Co. and managed by Forbes Rickard, an Ingersoll-Rand electric compressor, a 65-hp. Westinghouse motor, a Deming electric pump of a capacity of 50 gals. per minute are being installed and numerous other improvements are being made. The shaft is nearing the 400 ft. point, and the ore shows values of \$25 to the ton, with a strong vein. A rich strike was recently made in this property by breaking through the wall of the drift, showing a parallel vein carrying a high percentage of lead with silver and gold values.

The Lorillard mine, at the junction of the Russell and Willis gulches, operated by Chicago people, has attained a depth of 212 ft.

The Champion Mining & Milling Co., operating in the Phoenix district, is handling about 25 tons of ore per day in its 10-stamp mill. The ore runs about \$20 to the ton and the saving is about 80%.

The Jefferson & Calhoun Mining Co.,

operating at the head of Russell gulch, is working from four shafts. This property has recently been consolidated under one head and heavy shipments are made daily. A large amount of development work is being done and the main shaft is being sunk to the level of the Newhouse tunnel, a depth of about 1,800 ft. This shaft is equipped with a steel galloways frame extending 65 ft. above the collar of the shaft and an automatic, self-dumping apparatus which delivers the ore directly into the bins. The building also is constructed of steel and contains one of the largest plants of mining machinery in the state. The compressor plant has a capacity of 35 air drills.

Many miners formerly employed in the tungsten district about Nederland are now operating in Caribou.

#### Cripple Creek.

The output of ore and gold bullion from the mines of Cripple Creek this month exceeds that of any previous month this year. The late panic had no other effect upon the mines of this district than to stimulate production. The only impediment is too much water, which will be removed in due course by the deep drainage tunnel.

The great Portland Mining Co., which has for two years been considering the erection of a large cyanide plant at the mine to handle the enormous tonnage of dump material and also the vast amount of low-grade ore in its miles of drifts and slopes is now practically prepared to go ahead with the project. It is stated that Frank Peck, the present manager, is about to put the scheme into practicable shape.

Moore & Seeley, mining the Lucky Gus under lease, are breaking and shipping 16 cars of ore per month that averages \$50 to the ton. The shoot on the 400-ft. level is 4 ft. wide.

The J. I. claim belonging to the Republic Co., on Battle mountain is shipping carloads of material that carries an average of \$42.40 to the ton.

The South Burns Co., operating the South Burns of the Acacia, is working a 4-ft. vein that yields from 2 to 3 ozs. to the ton.

All the principal mines are under development and the leasing system is bringing to light many new bodies of valuable ore.

The pay shoot in the Gold Sovereign on Bull hill is reported to be widening with development and is now showing a width of nearly 48 ft. on the 600-ft. level. Shipments of one car daily return from \$16 to \$24 to the ton.

The output of the Trilby thus far in July was 24 broad-gauge cars, the ore carrying \$23 to the ton. There are thousands of tons of low-grade ore broken for treatment at the Trilby mill, recently completed and equipped with the latest improvements and soon to be put in commission.

The Tornado Leasing Co., operating the Tornado mine of the Elkon Cons., has a 2 1/2-ft. vein at a depth of 700 ft. that yields 1 1/2 ozs. to the ton.

Lessees on the Ajax are shipping regularly from a large vein.

Taubert & Co., leasing on the Lonaconing on Beacon hill, has just cut a new vein at a depth of 400 ft. The shoot meas-

ures 3 1/2 to 4 ft. and contains much sylvanite. Assays run from \$60 to \$100. A large amount of money is to be expended in developing the Dexter mine on Bull hill.

Chas. Bender and associates, who recently made a fine strike on the Stratton Independence, are producing much ore estimated to run \$100 to the ton.

The Golden Cycle mill at Colorado City is treating from 800 to 900 tons daily.

The net profits of the Mary McKinney for the last fiscal year were, according to the last annual report, \$55,589.61. The entire property is said to be in very good condition.

Lessees operating the Molly Kathleen mine on Tenderfoot hill have opened a shoot from 5 to 10 ft. wide worth from \$20 to \$25 to the ton.

The Union Leasing Co., working the Deadwood mine adjoining the Hul! City placer, has a vein which assays \$100 to \$200.

Wilson & Morrison have secured a lease on the entire dumps of the Ajax Gold Mining Co. and will start operations on a large scale.

James P. Wilson of South Dakota has purchased machinery for the Colorado Boss No. 1 on which he has taken a lease.

More & Halman, leasing the Mountain Beauty on the south slope of Bull hill, are shipping 30 cars per month of very high-grade material.

The Little Clara and Lucky Corner, leased by Humphreys & Thompson, is yielding ore worth about \$55 to the ton.

#### IDAHO.

Wallace.

Two boilers, an air compressor and other machinery amounting to \$7,000 have been purchased by the management of the Monitor mine and will be taken at once to the property, where it will replace the machinery lost by the company on a recent suit. This will increase the power at the mine 400%, it is said. A crew of 27 men is now at work. Sinking from the 400 level will begin as soon as the new machinery is in place.

Two test shipments of concentrates from the Bullion mine have been made at the Tacoma smelter and are said to have been satisfactory, but figures are not given out. A shaft is now being sunk to the 300 level, at which point copper ore is expected. The ore thus far encountered carries an excess of iron.

Two galena stringers have been encountered in the Canyon Creek Fraction property near the Hercules mine which indicate the presence of valuable veins at depth. One is 2 ins. wide and the other 4 ins. on the foot and hanging walls respectively. The vein has not yet been entirely crosscut.

A contract for additional tunnel work on the property of the Silver Mountain Mining Co. near here has been given to W. W. Bradley at \$7.50 per ft. The tunnel is in 400 ft. It is expected that the ledge will be encountered in another 100 ft. on which drifting will begin. A depth of 300 ft. will be obtained in the present tunnel.

An assessment of three mills a share has been levied on the stock of the Park

Copper Mining Co. for development purposes. Delinquent stock will be sold at auction August 31.

Superintendent Auerbach of the Golden Chest gold mine near Murray states that this mine, which has been shut down for some time, is to be reopened.

The Black Bear Fraction at Black Bear now has 3 ft. of ore in its drift, which has been run 300 ft. on ore. Work is progressing steadily.

Directors of the Imperial Mining Co. in a recent meeting decided to push work on the long crosscut tunnel which is to tap the lead 722 ft. below the present workings. It is estimated that 2,000 ft. will have to be run before striking the lead, after which drifting will begin. A syndicate of Wallace and Spokane, Wash., men has been formed to finance the work which will cost \$30,000.

Ore of good quality is being encountered in the drift on the Paymaster mine at Kellogg. The streak is 2 ft. wide in the center of a 5-ft. vein. Work on the lead has run 100 ft., during which distance it widened 6 ins.

The Rex mine, which was shut down some weeks ago under debt, remains closed and several suits for wages, supplies, etc., have been filed. It was about to be reopened under new management, but this is indefinitely delayed. Much development work had been done just prior to closing.

One foot of shipping galena has been encountered in the Granite-Allie mine near Murray at the bottom of an 85-ft. shaft which had been completely in ore for 15 ft. At a depth of 100 ft. a crosscut will be run.

Work on a 2,800-ft. crosscut tunnel to intersect three veins of the Interstate mine will begin next week. A crew has been at work on the No. 3 level. The three leads will be cut by this crosscut 800 ft. below the present lowest workings and 1,200 ft. from the surface.

## INDIANA.

### Indianapolis.

James Epperson, chief of the Indiana Department of Mine Inspection, announces that he will go before the incoming legislature asking for the enactment of a law providing for the levying of a small tax on each ton of coal mined in Indiana, and also a tax on each dollar earned by a miner, the purpose being to create a fund from which the state may pay benefits to miners injured while at work in the mines and to families of miners killed while at work. Mr. Epperson states that while the details have not yet been worked out both operators and miners are in favor of such a law and that he believes that miners or their families should have damages without having to resort to the courts and fighting for several years. Mr. Epperson will also ask that a section of the law be made to provide for a small pension for miners who arrive at the age which incapacitates them for work in the mines.

The Summit coal mine near Linton in Greene county claims the state record for work during the last mining year, having

worked 290 full days out of a possible 308, and it would have been operated 10 days longer but for petty strikes. The operators of this mine also claim one of the best records for tonnage in the state. During the last year 241,000 tons was taken out. This is an excellent showing when 200,000 tons output is considered unusual in the Indiana field.

The 290 men employed in the Talley Coal Co.'s mine in Clay county are threatening to strike because of an order requiring the men to call at the company's stores for their pay. The miners insist that, while the annual contract does not cover this point, a custom to pay at the mine in vogue for 40 years has practically made it a part of the contract. If the men strike the company will exact the fine of \$1 per day for each man while out, while on the other hand the miners will endeavor to enforce the clause in the contract requiring the payment of \$1 to each man so laid off.

## LAKE SUPERIOR.

### COPPER.

#### Houghton, Mich.

The grading of the road bed and laying the rails on the railroad link which will connect the Superior mine with the Atlantic & Lake Superior railroad is now underway and it is thought that it will be completed in about two months. The ore from the Superior mine can then be shipped to the Atlantic mill, where arrangements have been made for the use of two heads. Developments are continuing to expose a uniformly mineralized formation of a good grade. Considerable ore is on the stock pile ready to go to the mill as soon as stamping is begun and new reserves are being daily opened. Good progress is being made in the work of enlarging No. 2 shaft from a 2 to a 3-compartment.

Much interest is being shown in the diamond-drill exploration work being carried on in Ontonagon county. Three drills have been at work and three new drill locations have recently been made, one at the Victoria, one at the Michigan and one at the Adventure.

It is believed that the Lake Lode traverses the area now being drilled by the Victoria. In addition to this diamond drill exploration an adit is being driven in a northerly direction across the formation and a crosscut is being driven across the formation in a southerly direction from the working shaft near the center of the property. These two openings are being driven toward one another and about 400 ft. apart. When they meet altitudes between the shaft and the southern boundary will be exposed. All the lodes crossing the property will be mapped.

Shipments are now being made from all four of the Isle Royale's shafts. The greatest tonnage is coming from shafts Nos. 2 and 6 which have large areas of stopping ground opened up.

A diamond drill operated by the Dakota Heights Co. west of Houghton and near Portage lake has penetrated the copper-bearing amygdaloid which is thought

to have a width of 18 ft. The core was taken from a depth of 700 ft. on a 45 deg. incline, but at right angles to the incline of the formation.

### IRON.

#### Marquette, Mich.

In the effort to open the Syracuse mine of Pickands, Mather & Co. in the Embarras Lake district, east of Hiawak, Mesabi range, a new shaft is to be sunk. It is at this property that the heavy overburden of quicksand and bowlers first occasioned tremendous difficulties. For months past the great inrush of water has made sinking slow and costly and has so far defeated the attempt to tap the ore deposit. It will be the function of the new opening to serve as a well into which it is hoped the water will drain in sufficient volume to relieve the deluge in the present workings. Now that pumps of a capacity of 7,000 gals. a minute are in place to prevent the drowning of the mine entirely, it is found that the old shaft is too small for both mining and drainage purposes. Little or no work will be done in the way of sinking to the ore body until the new shaft is prepared to handle a portion of the water. The source of the water is a mooted question, but it is the opinion of mining men that it comes from the Embarras lake and river, which are in close proximity.

The Ranger mine a short distance west of the Syracuse and which also is being developed by Pickands, Mather & Co., is also troubled with water, but in not near as great a degree. The ore has been reached and the deposit is being developed.

The Jones & Laughlin Steel Co. is opening a good-sized underground mine in its Meadow property at Aurora. The most important development work now in progress is at a depth of 175 ft. There are two shafts, one of which has only recently received its permanent equipment of machinery and hoisted its first ore. From the other shaft, known as the Fowler, and in which little or no work is being done at present, 35,000 tons of ore were shipped last season. This was the initial production of the mine the development of which was started only last year. It is not the intention to operate the Meadow vigorously for some time yet, but meanwhile the openings will be extended and when the ore is needed the property will be ready to supply it.

On the Marquette range, the Jones & Laughlin Co. is developing a very fine mine at Negaunee. This is the Rolling Mill property at which an extensive deposit of ore of excellent grade is being opened at a depth of some hundreds of feet. The Rolling Mill will eventually take the place of the company's Lake Angelina mine at Ishpeming, which, having produced almost 8,000,000 tons of ore to date, has seen its best days, although assured of an active life of a number of years yet.

The New York State Steel Co. intends if possible to ship 100,000 tons of ore this season from the Larkin property, formerly the Tesora, at Virginia, and the Kellogg about midway between Biwabik and McKinley. Both are underground mines



and are being developed on lands owned by W. H. Yawkey. The lease under which the Kellogg is operated calls for the payment of a royalty of \$1 a ton, about the highest in effect in the Lake Superior region.

Adjoining the Kellogg on the east and containing Bessemer or of similar excellent quality is the Republic Iron & Steel Co.'s Monica property. The work of opening the Monica was started last year, but was subsequently suspended, since which time the property has been idle. It is understood that operations are soon to be resumed and some ore shipped this season. The Monica is also an underground proposition.

A particularly large stripping operation on the Mesabi is that in progress by the Steel Corporation at its Hartley mine at Hibbing, first opened last year. Five steam shovels are employed. Several years' work will be required to remove the overburden. The property comprises four forties, and the ore body extends across it almost from one side to the other. At its greatest breadth, the deposit is upwards of 1,000 ft. in width. The ore dips to the east into the Pittsburgh Iron Ore Co.'s Croxton mine. The Hartley sent out 345,000 tons of ore in 1907. It is not being mined at present, but it is prepared for heavy shipments at any time.

Similar work done by contract is practically completed at the corporation's Pillsbury mine, in the same field.

Three shovels are engaged in stripping at the Shenango Furnace Co.'s Shenango mine, and in the west end of the pit the ore is uncovered. The removal of the surface here is the heaviest work of the kind yet attempted on the Mesabi, the overburden ranging from 90 to 110 ft. in depth.

Just northeast of Hibbing the Steel Corporation is still engaged in the work of transforming the Sellers mine from an underground proposition into an open pit. Three shovels are in commission. The operation was started in November, 1900, and a portion of the pit near the business district is now ready to ship.

The product of mines on the Marquette range has lately been moving more freely than at any previous time this season. At Ishpeming and Negaunee, where the greater number and the most important producers of the district are located, practically all the properties are shipping direct from shafts and most of them are also loading cars from stockpiles. From 8 to 10 steam shovels are doing duty in the two cities. The Breitung Mining Co. has one shovel on Mary Charlotte property, where it was necessary to cut working forces in half some weeks ago because the stockpile had already spread over all the available space.

Oglebay, Norton & Co. are filling an order for 40,000 tons of ore at their Empire mine five miles south of Negaunee.

A Milwaukee concern, to which the contract was awarded, is erecting two big steel smokestacks at Negaunee mines of the Steel Corporation. One at the Hartford is 100 ft. high by 6 ft. in diameter and weighs 11 tons. The other, at the Blue property, is 100 ft. high by 4½ ft. in diameter and weighs nine tons.

Ore shipments from the Menominee

range continue somewhat lower than from the other districts and most of the mines are doing but little.

Oglebay, Norton & Co. have reopened their two Chatham properties in the Iron River-Stambaugh territory, but their Bristol, Traders and Berkshire mines continue idle. The development previously carried on at the Berkshire has resulted in proving a large body of ore of excellent grade.

At Iron Mountain the last of the machinery is being installed at the Jones furnace, which is designed to make steel direct from ore, and it is expected that the plant will go into commission the first of August.

Pending the installation of new hoisting plants, 175 men have been laid off at "A" and "B" shafts of the Steel Corporation's Norris mine at Ironwood, Gogebic range. The new hoists will constitute the permanent equipment of the shafts.

The Chicago & Northwestern railroad is adding 500 new 40-ton steel ore cars to the rolling stock of its Gogebic range division, the first lot having recently gone into commission.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week of July 25 and the year to date were as below in pounds:

### LEAD ORE SHIPMENTS.

Camps.	Week. July 25.	Jan 1- July 25.
Atlas-Neck City .....	2,350	187,700
Aurora .....	12,250	211,250
Badger-Peacock .....	33,214	811,970
Carl Junction .....	1,780	129,350
Carthage .....	6,170	6,170
Cave Springs .....	.....	11,220
Duenweg .....	74,850	2,466,251
Galena .....	152,920	2,942,762
Granby .....	23,000	949,680
Joplin .....	288,550	8,337,110
Miami .....	4,470	688,310
Oronogo .....	.....	341,130
Peoria .....	.....	1,530
Prosperity .....	30,880	2,322,010
Quappaw-Baxter .....	.....	639,620
Seneca .....	.....	164,560
Springfield .....	.....	27,020
Spurgeon-Spring City .....	122,500	1,765,890
Wells City-Cartersville .....	532,500	21,765,890
Westworth .....	4,310	125,670
Zincite-Sherwood .....	.....	.....
Total lbs. ....	1,320,640	41,114,284
Value .....	\$36,437	\$1,198,585

### ZINC ORE SHIPMENTS.

Camps.	Week. July 25.	Jan 1- July 25.
Atlas-Neck City .....	297,260	13,629,870
Aurora .....	.....	9,135,350
Badger-Peacock .....	199,820	12,385,760
Carl Junction .....	.....	1,152,000
Carthage .....	197,310	4,008,210
Cave Springs .....	.....	800,740
Duenweg .....	264,270	16,961,810
Galena .....	413,600	20,912,360
Granby .....	397,850	12,158,010
Joplin .....	1,903,250	64,997,470
Miami .....	61,650	2,656,858
Oronogo .....	421,720	9,713,650
Peoria .....	.....	414,660
Prosperity .....	489,635	8,741,052
Quappaw-Baxter .....	.....	2,843,120
Seneca .....	.....	171,810
Springfield .....	62,500	2,469,180
Spurgeon .....	.....	36,640
Wells City .....	185,550	6,497,421
Westworth .....	.....	182,390
Wells City-Cartersville .....	1,161,120	79,437,717
Westworth .....	.....	797,620
Zincite-Sherwood .....	100,640	1,852,370
Total lbs. ....	6,389,305	272,834,061
Value .....	\$106,000	\$4,597,105

Webb City, Mo.

The ore market for the past week was

more settled than for some time and this week it is on the same basis as last with zinc ore selling from \$33 to \$35 per ton. During the week the large plant of the Meadville Co. in the south of Webb City field, the Whitsett mine of the old Dominion Co. and the American Beauty No. 2 in the Duenweg district were closed down. The most active camp in the entire district at present is Oronogo with every property operating and a large extension of the field by the successful prospecting of the Granby Mining & Smelting Co. But little work is being done in the Granby camp.

Mrs. Florence Sholl is developing a lease on the Baker land at Porto Rico. Six drill holes show ore from 212 to 235 ft. A shaft is being put down which progresses slowly owing to the fact that almost solid limestone has to be penetrated. The dirt carries 16% zinc blende. Mrs. Sholl also owns a lease in the Duenweg camp near the San Gabriel where eight drill holes located ore from 218 to 239 ft. The tract will be further developed.

A new drift in the Colgen mine north of the city has penetrated high-grade ore at 124 ft. It is the best ore so far found in the mine.

Hill Top ground west of the Oronogo Circle Co. has been drilled by the Granby Mining & Smelting Co., showing an 8-ft. face of rich sheet ore at 200 ft. Both lead and zinc are found. The lease will be brought rapidly to the producing stage and then subleased. This is the third rich tract added to the camp recently by this company.

Joplin, Mo.

Another new strike has been made on the Scranton land, this time by the Blue Bird Co., which opened up a rich body of zinc-blende at 35 ft. A boiler and steam hoist have been installed. The ore is cleaned on hand jigs.

A rich strike has been made at Chiswood by McNeal and Sharp on the Jack Rose property. Ore was encountered at 150 ft. A 26-ft. face of rich milling ore was opened up.

A boiler and power plant has been installed at the J. A. Potter mine on the South Joplin land where a good run of zinc-blende is being mined. The company has experienced some difficulty from the corrosive action of the water which necessitated acid-proof pumps. The lease has three shafts into the ore, which is being cleaned for the present on hand jigs and the crush rock thrown aside for mill treatment when enough accumulates. Operations will be begun in the mine as soon as the shaft is drained.

Preparations are being made to reopen the old Midway camp northeast of Joplin. The Evans Mining Co. has a lease on seven acres and began reopening the ground last September, but were forced to discontinue when the adjoining lease closed down during the panic as this company could not handle the water alone. The ground is now being drained by this and adjoining companies and the 100-ton mill is ready for the treatment of the ores as soon as they can be removed.

Alla, Mo.

The Alla camp at the extreme northern end of the district is more active than it

has been for some months. Drilling is being done in almost every direction from the town.

The greatest activity has been on the Quick Seven Mining Co.'s land or on sub-leases. The ore was first struck here at 20 ft. and continued to 100 ft. A shaft is completed and a good grade of ore was removed during its sinking.

The Locust Mining Co. west of the Alma camp near Purcell has undertaken to drain the ground and reopen the shaft. A pump and hoist have been installed.

Southeast of Alma on the Weaver farm a new strike of rich lead has been made at 127 ft., whereas hitherto all strikes have been made at 140 ft. The shaft will be sunk to 175 ft., which it is hoped to have completed by the last of August. A steam pump has been installed to handle the water.

The Cameron mine continues to operate during the low ore price as does also the Optimo. Both are located at Sarcocix. Drifting is being done to the north and south of the shaft at the Cameron. A 40-ft. face of ore was being worked when the company began further development work. A mill is planned for this mine before the end of the year.

In the Aurora camp in the eastern portion of the district Scott & Coleman have begun further work upon the Tooker land where some rich strikes were made last fall. The shaft was under 100 ft. when the heavy rains of the spring drowned them out. If the ore proves as rich as the drill record indicates a large modern mill will be built at once.

#### Miami, Okla.

A very rich strike was made last week on the Baxter Royalty's land by J. W. Barnes in a drill hole to the east of the Miami Yankee. The dirt runs 20% zinc. This is the third zinc strike made on the Baxter land.

The erection of three mills in this camp has just been completed. They are the Kenwood, the King Jack and the Buckeye.

Barnes, Wigginton & Milton, well known mill builders in the Webb City camp, have taken a 10-acre lease and have made one of the richest strikes ever made in the camp. The drill entered ore at 86 ft. and remained in ore for 50 ft. A shaft is being put down and preparations are under way for a new mill.

The Miami Yankee has started on the fourth drift and entered a good run of lead and zinc. Under the new field manager a new scheme of development is being undertaken. The drifts are being driven upward on an incline.

#### Baxter Springs, Kas.

The Mission mill after a brief shut down is again operating. The lead ore increases as the lower level is being worked to the south and southeast. The company is preparing to erect a second mill of 500 tons capacity.

The Old Abe Mining Co. has been pumping the past week and will be ready to operate at once. The drifts to the east are just entering the same lead formation which is being worked in the Hawkeye on the adjoining lease.

Several of the producing properties which have been closed down are to be

opened up at once. The Alabama property will start Aug. 1 and a new mill will be built on the lease the coming year. An 8- to 10-ft. face of lead lies above a 35-ft. face of zinc.

The 3 F. mine started up this week and is pumping the lower levels. The mine has been thoroughly developed and the lower levels are rich in ore.

## MONTANA.

### Butte.

The Parrot Co. has its greatest prospect in its new Little Mina mine, which, under the direction of Superintendent H. A. Gallway, is being developed into an important producer. It is opened by a shaft 100 ft. deep and by three levels at 600, 800 and 1,000 ft. Preparations are being made to sink the shaft 200 ft. deeper. At present mining is confined to the 1,000 level, where the vein, located south of the shaft, has been opened east and west nearly 500 ft. On the west there is 100 ft. of ore, 4 ft. wide, giving an average assay of 34% copper and 6 ozs. silver. To the east there is another body of ore about 170 ft. long and 3 ft. wide, giving about the same average assay, while another ore body on the east end is 100 ft. long and 18 ft. wide, giving an average assay of 4% copper and 6 ozs. silver. Several feet in width run from 12 to 15% copper, but the whole body 18 ft. wide is broken down and mined as second-class ore. The Little Mina is yielding about 150 tons of ore per day, but preparations are under way to increase the output. A new auxiliary engine is being installed for the purpose of sinking the shaft to the 1,200 level, and a new permanent hoist will also be installed with a capacity of 500 tons per day and capable of working to a depth of 2,000 ft.

The Reins Copper Co. stockholders at the annual meeting held in Butte filled the board of directors with Pittsburgh men, with two exceptions, J. P. Reins and Glen Thompson of Butte being retained. The Pittsburgh men are Colonel James M. Guffey, E. W. Marland, W. P. DeArmitt, A. P. Childs, Jr., T. N. Bernsdall, George D. Prentice, John H. Galey, W. F. Johnson and August Hartje. At the meeting 1,708,000 shares of stock out of 2,000,000 were represented. A report of the affairs of the company shows that \$129,000 was expended in operating the mine and for new equipment, and that one of the value of \$200,000 was shipped last year. Operations were not carried on during most of the year, the mine being closed at the beginning of the financial panic. A special meeting of the stockholders will be held August 12 to vote on the proposition of issuing \$200,000 in bonds.

Robert H. Gross, the new president and general manager of the East Butte Copper Mining Co., is in Butte. He found the affairs of the company in a very satisfactory condition and the mines in good shape. The company has a good treasury and Mr. Gross is considering the question of resuming operations.

The West Gray Rock mine, one of the Butte & Boston producers, is developing surprisingly. On the 400 level a big body

of ore was opened recently and it is growing larger as mining proceeds. Miners say they are working on a vein 18 ft. wide and the ore assays 7% copper.

The North Butte Extension Co. is paying off its debts and expects to be in shape to resume operations in a short time. The first claims to be paid off were those of the laborers for June and July.

The Butte Central & Boston Copper Co. appears to have difficulty in raising funds and claims against the property are increasing. It was represented a short time ago that \$8,000 or \$10,000 would pay off all pressing debts, but attachments have been placed on the property until now \$20,000 or \$25,000 will be required. The latest attachment is by the Butte Commercial bank, which sues for \$5,000 and interest due on several notes.

The Butte-Milwaukee Co. has received its new machinery ordered last fall and preparations are being made to resume sinking on the Colonel Sellers claim on which a shaft was sunk 700 ft. before operations were stopped.

Gradually many of the new companies in the Butte district which were forced to stop work last fall are resuming development work. The North Butte Mountain Co., which owns a group of claims in the Butte & Bacon district, is the latest to become active again. It has let a contract for sinking a 500 ft. shaft.

The Surprise Eagle Co. is also making arrangements to resume work on its property in the southern part of the city.

### Helena.

A company of Helena men is developing the Bell Boy mine about three miles from Marysville. The officers of the company are: Fred E. Hoss, president; Edward F. Beadle, vice-president and superintendent, and Samuel W. Longhorne, secretary and treasurer. A new shaft has been sunk, to the depth of 72 ft. and a drift run 200 ft. on the lead from which two winzes have been sunk. One reaches 200 ft. below the apex of the ore shoot. The bottom of this winze is in a body of milling and concentrating ore, 5 ft. wide that carries \$30 to the ton in gold, silver and lead. A shaft is being sunk farther down the hill from which a drift will be run to tap the vein about 60 ft. below the bottom of the deepest winze. About 35 tons of ore per day is being treated at the Bald Butte mill, but the old Jerusha mill has been leased by the Bell Boy Co. and as soon as it can be put in repair will be used to treat the ore.

The new 2-stamp mill at the Arrow Head gold mine in Old Dominion gulch is reported to be running steadily. The first clean-up from 125 tons of ore showed about \$25 to the ton. A 10-hp. gasoline engine supplies the power. The mine is developed by an incline shaft following an ore shoot to a depth of 40 ft. The property consists of five claims and is owned and operated by Daniel and David Dutro and John Cornwall.

Work has been begun on the driving of a 100-ft. tunnel on the Blue Bells and Annie A. claims between McClellan and Mitchell gulches 10 miles southeast of Helena. It is expected that the tunnel will develop the lead 40 ft. below its apex.

## NEVADA.

## Rhyolite.

Most of the machinery for the Springdale mill just north of Springdale has arrived and is in place. The equipment will be complete with the arrival of the 80-hp. gas engine, air compressor and zinc boxes. It is expected that the mill will be in operation in about the middle of September. A new cyanide process, invented by Rankine & Newcomer, is to be used. The ore is first roasted and then revolved for one hour in a barrel with normal cyanide solution under a pressure of 20 atmospheres. It is expected that, by this process, a considerable saving in treatment cost will be made. The ore developed runs about \$12 to the ton. Custom ores will be received as soon as the mill is in good working order and the mill will be enlarged as soon as business warrants.

A shipment of approximately 11,000 ozs. of bullion valued at \$33,000 is reported to have been made to the Selby smelter by the Montgomery Shoshone Cons. Mining Co. This shipment represented the clean up of zinc precipitates for the month of June. In addition to this about 35 tons of rich concentrates were also saved. Superintendent J. C. Kirchen states that the June output was up to the average.

The first shipment of two tons of high-grade ore has been sent to Goldfield for sampling from the Capricorn property in the South Bullfrog district. The shipment came from the drifts above the 50 level, where the vein has been explored for some distance. One drift is out 46 ft., with values all the way, and this will be extended about 35 ft. farther, when a winze will be sunk. It is probable that a new shaft will also be sunk to connect with the lateral. The property is owned by J. P. Burns and Capt. E. P. Miner.

Another strike of cinabar has been made in the new camp of Telluride in the east end of the Bullfrog district on the Murphy & Sweeney lease. The ore was encountered at a depth of 40 ft.

## Tonopah.

The shaft on the Everett property in the Atwood district is down 250 ft. and has encountered an ore-bearing ledge. A Cameron pump has been installed and sinking to greater depth will be done.

California and eastern people have acquired the Pactolus mine about seven miles from Atwood. The sum involved is given as \$125,000 on which the first payment has been made. It is the intention to equip the mine with modern machinery.

Favorable results are reported from work on the McNamara mine and three cars of good milling ore amounting to about 150 tons were recently sent to the mill. Stopping has been started from the east drift from the bottom of the winze about 50 ft. below the 300 level. It is now about 15 ft. from the winze and exposes a good ore body. The main stoppage from the west drift on the 300 level is up about 50 ft. and good ore is being broken by machine. Other work is being done for exploration purposes.

## Winnemucca.

The new camp of Red Butte in this county is reported to have some excellent copper, gold and silver ores. Strikes have

been made on the Redeemer and II Trovatore groups. The Anderson & Holcomb copper properties have been taken over and will be developed by the Nevada Anaconda Mining & Development Co. recently incorporated.

Operations on the Dreamland lease at Rosebud are to be carried on at a more extensive scale for which the necessary supplies and equipment have been purchased. Two shifts are now at work in the east and the west drifts on the 100 level. Each drift has been driven approximately 50 ft. from the shaft and an excellent body of ore exposed. On the 100 level the vein is exceptionally strong, varying in width from 2 to 4½ ft. The vein matter on the 100 levels is of the same character. The values are principally in gold. The lease is being operated by L. F. Vaile, Roy Bullen and George Wilson.

Discoveries of copper ore reported to carry good values in gold and silver have recently been made in the Harmony range to the east of this place. It has been thought for a long time that only copper-bearing ledges were to be found there. The new discoveries were made on the property owned by Julius Sigmund and Chris. Deiss on which there is a network of ledges carrying good copper ore. Considerable development work, consisting of shafts and tunnels, has been done and large bodies of copper ore have been disclosed.

A high-grade ledge of copper ore has lately been struck near Cross canyon by W. L. Akin. The ore is of shipping grade.

The Goldbanks Extension claim at Goldbanks, Pleasant valley, 40 miles south of Winnemucca, has recently been sold to E. A. Stauffer, W. J. Merchant and Edward Reinhardt of Winnemucca. The new owners have during the past few months done considerable development work on the property under an option. A shaft was sunk 140 ft. from the bottom of which drifts were run on the ledge which is from 8 to 11 ft. wide. Large bodies of milling ore were encountered as well as some high-grade gold ore.

## Goldfield.

Ore is being shipped from the Colmination Fraction to the Nevada Goldfield reduction works at the rate of 100 tons per day. The value of the daily production is given as \$10,000.

The property of the Goldfield Daisy Syndicate under the management of Walter C. Geddes has been put into shape for a future large and continuous output. The vein has been crosscut for 60 ft.

## MISCELLANEOUS CAMPS.

**Golconda.**—Arrangements are being made to install a \$5,000 gasoline hoisting plant on the Florence group of claims in Gold Run basin, 12 miles south of here. A number of veins yielding panning ore cross this group. One shaft is down 50 ft. from the bottom of which 45 ft. of crosscutting has been done, which has uncovered a 19-ft. ledge that shows good values in gold. Another vein on the property ¾ ft. wide also shows excellent ore. There are a number of openings on the property and gold ore is exposed in a number of places, some of it

said to be of very good grade. A shaft is to be sunk 300 ft. or more.

**Elko.**—It is reported that large bodies of high-grade copper-silver ore have been encountered on the property of the Delmas Copper Co. in Lee canyon. The property is being worked by a tunnel only. High-grade ore is now being shipped.

**Pioche.**—It is stated that the engine and air compressor for the Nevada-Des Moines property are about ready for operation. When these are ready sinking of the shaft on the Baltimore claim will be pushed. Ingersoll drills will be used in the work. D. C. Mahedy is manager.

**Ely.**—The new 30-ton mill of the Stuart Mines Co. at Cherry creek is about completed. Stamps of the Nisson pattern weighing 1,350 lbs. each will be used crushing the ore to 40-mesh. The mill will also be equipped with Calford tanks and screens and Wilfley tables.

## OREGON.

## Grant's Pass.

The old Maid of the Mist mine on Thompson creek near Grant's Pass, which has been idle for the past two years, has been taken over by the South Oregon Mines Co. for development and operation. Manager C. A. Hurst has placed a crew and states that the installing of equipment will begin at once. In order to push the development of the property with the best possible speed a large 6-drill compressor to be operated by steam power will be placed. There is, however, considerable water power on the claims which will later be used for this purpose. As soon as the ore body is opened up sufficiently a mill will be put up and the mine operated on an extensive scale. The Maid of the Mist is one of the richest quartz properties on Applegate river. Its main ledge has a width of 3 ft. and carries ore running from \$30 to \$100 to the ton. The quartz is practically all free milling. Some remarkably rich strikes have been made on this property.

The Opp mine in the Jacksonville district, owned and operated by the Opp Cons. Mines Co. of New York, is undergoing a complete overhauling and a change in method of ore reduction is being made. The 20-stamp mill is being dismantled and in its stead a cyanide plant is being installed. A portion of the mill only will be retained. The mill worked successfully in treating the surface ore, but the deeper ores demand a process of cyaniding. The plant will comprise 16 tanks with crushers capable of treating about 200 tons daily. The tanks are now being placed and the new plant will be ready for operation before the close of summer. In the meantime the development of the mine is proceeding and when the plant is ready an enormous body of ore will be uncovered. Electric power derived from the plant of the Rogue River Electric Co. at Gold Ray will be used. The Opp is one of the oldest quartz mines in Oregon and, as a 5-stamp mill proposition, yielded an immense fortune from the free-milling ores near the surface. It was later more deeply developed and a 20-stamp mill has been operated for the past four years.

An unusual amount of prospecting is being done this season in the lower Rogue

River country, below the old camp of Galice. The splendid results being derived from the Galice mines is largely responsible for this. Another thing that has led men into this remote section is the building of the government trail down Rogue river from Galice. In former years it was almost impossible for a man, even on foot, to reach the gravel bars and mineralized hills of the lower Rogue country. The government, through the forest service, has built a trail into the district at an expense of several thousand dollars. Supervisor M. J. Anderson of the forest service, who lately made a trip of inspection into the district, states that scores of gold hunters are now prospecting the mountains and gravel bars of the lower Rogue country and that a number of rich strikes have been made both in quartz and placer. The trail opens up the remote section of Curry county and gives access to a vast territory of richly mineralized country.

A company composed of Seattle miners and investors through their civil engineer, Glenville Collins, has begun the surveying of an electric railway from Grant's Pass to the copper and gold mines of Waldo and other districts on the Illinois river. The company has secured right of way over the county wagon road. Arrangements are also being made for a joint wagon and electric car bridge across Rogue and Applegate rivers. The company has ample capital behind it and will evidently push the work to completion. There is abundant power on both Applegate and Rogue rivers for the operation of the line. The road will give transportation facilities to all of the principal mining districts of Josephine county, and will make it possible for the smelter and copper mines of the Waldo district to operate continually.

The heavy steel plates, large pumps and other parts of the equipment for the bed-rock gold dredge that will operate on Rogue river has arrived at Merlin from Sacramento and will be hauled by wagon over the mountain road to a point below Galice Mining camp. From there the equipment will be conveyed down the river by barges. On account of the dangerous and unsafe passage through Hell Gate above Galice the Gilman Bedrock Mining Co. behind the enterprise, believed it safer to haul the equipment by wagon to Galice.

## SOUTH DAKOTA.

### Deadwood.

Final steps toward the resumption of operations on the property of the Safe Investment Gold Mining Co. at Benchmark, south of here, were taken at the annual meeting of the stockholders, held in this city. The company holds about 1,300 acres of patented ground in the flat formation, where several ore bodies have been worked and are partially developed. The ore is of a low grade. The officers elected were: John L. Novak, president; Mrs. T. E. Ireland, vice-president; Samuel Tilton, treasurer; I. A. Webb, secretary and superintendent. F. H. Woodbridge, Chas. Cobb, Chas. Laughbridge, Samuel Tilton, J. L. Novak and Mrs. Ireland compose the directorate. It is

hoped to have the 40-stamp mill in complete operation before the end of the summer.

The first clean up at the Minnesota Mines Co.'s new cyanide mill in the Maitland district has been made and is entirely satisfactory. For the past two months but one shift has been working and that but part of the time. Three shifts have been put to work now and the 200-ton plant is in perfect working order. The ore is being taken from the flat measures and at the same time the verticals are being opened up.

The American Eagle mill in the Bald Mountain section is being remodeled and a new Dorr classifier to handle the sands is being installed. The slime presses are being lowered down the hill to permit of the operation of the gravity process and two more slime presses of equal capacity will be added, which will be adequate to handle all the slimes. Several weeks will yet be required to put the plant in shape for running. When it is completed it will be operated day and night.

Secretary T. A. Harding of the Pluma Mining Co. writes from Des Moines, Iowa, that arrangements are being made to finance the plan for a mill of from 50 to 600 tons daily capacity. He is selling stock or 10-year 5% mortgage bonds and it is proposed to use the money thus derived for the plant and the further development of the ground. The Pluma Co. owns a large acreage near the city of particularly promising ground on which some development work has been done, exposing good ore. So promising is the outlook that the English company which has been securing ground in the Black Hills recently took an option on the property at \$2,500,000. The ground adjoins the Homestake and it is believed that the Homestake belt traverses the property.

Superintendent Joe Keller has commenced the running of several hundred feet of tunnel on the Gold Eagle property in the Maitland district and has started to sink a new shaft, which will be put down 200 ft. This tunnel is to be the principal working tunnel. It is now in 150 ft. and is expected to cut the ore body within the next 50 ft. It is the intention to drive 300 ft. farther along the foot wall and then to crosscut the ore. In the upper tunnel, which is in 70 ft., the ore body was found to be 30 ft. wide, but it is expected to find it wider with depth.

J. A. Bradley of Chicago, one of the owners of the Blue Belle group of claims in the Custer Peak districts spent some days here preparing for active development work on his ground consisting of 100 acres a mile east of the Custer Peak property. Some time ago a shaft was sunk 55 ft. deep on a quartz ledge which widened with depth. A drift was run on the ore, which is a fair-grade free-milling gold, amenable to ordinary methods of treatment. It is now intended to sink a new shaft 200 ft. deep near the old one. At the 200 level new drifts will be run in the hope of discovering other ledges. A recent discovery of some high-grade ore on the north end of the property has led to the belief that development at that point will prove productive.

One of the older companies that is now

planning to resume work shortly is the Titanic. Some of the directors have recently been looking up the possibilities of the future for the company, which owns ground that has always been regarded as promising. It is situated in the heart of a rich producing district and has some past development on the quartzite that showed up favorably. An electric company has set poles nearly to the hoist, which will permit of much cheaper operation than formerly and, as soon as financial arrangements can be made, it is expected that the work on the Titanic ground will be started.

### Hill City.

Mining in this section is unusually active and more properties are being worked than for several summers past. Not only are the mining men of the southern hills becoming more confident over the prospects here, but eastern investors are showing increased interest.

Preparations are being made for a resumption on the property of the Golden Metal Co. three miles east of here. This company recently took over the Hill City Electric Power & Mining Co. and expects shortly to commence the erection of an electric power plant which will cost in the neighborhood of \$50,000. The water rights are already secured. The plant will be constructed four miles below the city near the old J. R. Mills. As the company owns over 300 acres of ground, including the Old Summit mine, a steady producer of gold in the past, its future seems assured. On the Old Summit there is a 20-stamp mill where large clean-ups have been made. Its machinery will be supplanted by modern Homestake models, and the present estimate of the cost of treating ore with the new machinery is \$1.20 per ton. While the large majority of the principal ore body runs about \$2.50 to the ton in gold, there are many streaks that run as high as \$20.

Another new ore body that promises to be even better than the old vein has just been opened up on the Golden Slipper. While the older vein has in the past, and still is, yielding gold ore that runs anywhere from \$30 to \$100 to the ton, the average run of the new vein will, it is said, be better than \$50 to the ton. More active operations will be found on the property from now on.

Near the Golden Slipper, Klein and Burton have been driving a tunnel on their property, which is now in over 300 ft. and it is expected that they will encounter the vein matter within another 30 ft.

## UTAH.

### Salt Lake.

The 200-hp. electric pump which will lift the water from the 1,600 level of the Gemini mine to the surface has been tried out and found to work satisfactory. The pump is now lifting the water from the mine at the rate of 300 gals. per minute. It was installed under the direction of W. B. Sullivan. Another electric pump will be temporarily installed on the 1,900 level, but later when the workings are down to a greater depth it will be

removed to the lower levels. The work of installing the two new electric hoists, one in the Gemini and one in the Ridge and Valley, which is worked through the Gemini, will commence at once.

A new strike is reported in the Ralph claim of the East Tintic Development Co.'s properties. The ore was encountered on the bottom of the new shaft at a depth of 135 ft. The dimensions of the ore zone are not yet known. Assays of the ore show 10 ozs. of silver and 40% lead. When this property was first opened up a prospect hole was sent down 150 ft. and the ore was tapped. The present permanent shaft was then sunk over 125 ft. from the prospect work. It is planned to continue this sinking until the dimensions of the ore bodies are determined, when drifting will be started both ways on the vein. In the meantime the company is arranging for the installation of heavier equipments for exploring to greater depths. Active work on the ground was started only a few months ago.

Tying Bros., who have successfully operated the Miller Co.'s mines in American Fork canyon for the past four years, have finished their lease on that property and will now put all of their energy into the Texas Co.'s mines, comprising a group of 12 claims adjoining the Miller property. The Texas property was recently incorporated for \$1,000,000 by the Tying Bros. Considerable work has been done on these claims, but it is the intention of the company to begin afresh and to drive a tunnel several hundred feet which, it is expected, will encounter the ore formations that has turned out such splendid results in the Miller ground. The company will have the equipments used by Tying Bros. in the Miller workings and also about 95,000 ft. of mining timber stacked on the ground.

Upon the expiration of Tying Bros. lease on the Miller property it was turned over to W. A. Wilson, the Miller Co.'s manager in Utah, who announces that the property will be worked under the management of the company with John Jones, Jr., as superintendent. Work has been started on a 40-ft. tunnel to open up the ore body with the object of doing away with handling ore several times as the former operators did. Until this tunnel is completed the force of miners will not be increased.

The Uncle Sam Cons. Co. is preparing to load a car of ore from its new strike. The extent of the new ore zone has not yet been determined. It is making in the direction of the Beck tunnel ground. Assays of this ore are said to show 40 to 50% lead, from \$10 to \$20 in gold and more than 400 ozs. of silver to the ton. Mr. Chapman states that months of ore is blocked out in addition to the body being opened up in the new workings.

It is stated that the King William property in the Tintic district is to be developed through the Eagle and Blue Bell mine, through a drift running out to the south of the 1,000 level of the Eagle. Work is to be started within a short time. Such an arrangement with the Eagle will mean the development of the King William ground at a very small cost.

The work of rejuvenating the Carbon-

ate Hill Mining Co.'s properties, 17 miles east of Ogden in Morgan county, has been undertaken by Col. Matthew A. Dougherty. Considerable development work has been done on this property and a goodly tonnage of ores was extracted and shipped up to about two years ago. At that time the property was closed and has remained idle ever since. The management has decided to clean up the old workings consisting of a number of tunnels. In the lower of these, which is the main opening to the property, the ground has been opened for a distance of 457 ft. into the mountain. It is planned to continue this working for an additional 150 ft., at which distance it is expected that the contact will be intercepted.

The ores are of silver-lead and copper and are much sought by the smelters. A force of miners is now being organized and it is the intention of the company to continue operations through the summer and winter alike.

The Silver King Coalition Mines Co. is sending the product from its Park City mill and mine direct to the Murray plant of the American Smelting & Refining Co. The force has been gradually increased since the order was given to resume work to nearly 150 men. Additions to the force will be made from time to time.

## WASHINGTON.

### Republic.

A new strike of a vein 4 ft. wide has been made in the Globe mine on Tonlon mountain on the main tunnel level at an estimated depth of about 250 ft.

Basic ore assaying over 50% lead has been penetrated 9 ft. in the Copper Butte mine on Tonlon mountain.

In the lower tunnel of the Paymaster mine an important strike of payable ore has been made which will add much to the ore previously developed on this property. The company is arranging for the haulage of ore to the railway at Orient in transit to the smelter.

New work has been started at the Trophy mine under contract.

In the Deep Creek country a new strike of a 4-ft. vein of silver-lead ore which will pay for mining and shipping has been made in a crosscut tunnel in the Lone Pine mine at a depth of 70 ft. The mine is owned by British Columbia people.

A spur, six miles in length, will be built from the Spokane Falls & Northern railway to the United Copper mine near Chewelah. The company is about to install a new boiler and two Burlington ships, expecting thereby to increase the ore shipments to 1,000 tons per month. New levels are to be opened from the winze every 50 ft. below the 400 level. It is expected that this will double the present output. The raise from the 400 level to the surface will probably be completed some time in August. The company is employing 36 men and six 4-horse teams, re hauling ore to the railroad. The final payment has been made by this company on a bond taken two years ago for the purchase of six additional claims, on which an excavation has been made for the installation of an 100-hp. boiler and other machinery.

A discovery is reported eight miles

from Chewelah of a vein of asbestos, which has been traced 1,200 ft. in length.

The Keller & Indiana Smelting Co. has begun work on the upper tunnel level of the Manila mine and will start hauling ore to the smelter as soon as there is sufficient broken to keep the teams steadily moving. The company is raising toward the surface to get good ventilation, and will sink a winze to determine the dip and rake of the pay shoot. A connection will be made with the pay shoot by raising from the lower tunnel in which a track is being laid to expedite the work. Ore bins will be constructed at the portal of the lower tunnel, and from there a wagon road will be built for the haulage of ore to the smelter. Electric drills will be used.

The second carload of ore broken by the lessees of the Republic mine was shipped to the Granby smelter, at Grand Forks, B. C., July 20.

At Covada the Advance Mining Co. has made a new strike on the 300 level of the Advance mine of highly mineralized quartz, accompanied by a streak of rich galena 16 ins. wide. Last year this company prospected their mine with about 1,600 ft. of openings, and this year over 500 ft. of work has been done. In August the working force in the mine will be doubled.

### Loomis.

A disagreement among the members of the Palmer Mountain Tunnel & Power Co. has resulted in the temporary shutting down of the mine and nearly completed mill. E. W. Biedler, the superintendent, has resigned. F. G. Burnham of Holyoke, Mass., who is familiar with the company's property, has arrived and, it is expected, will take charge.

Monroe Harman, manager of the Ruby Mining Co., operating on the Similkameen river at the base of Mt. Chopaca, is returning from the east, and it is expected that a chlorination plant will be put in to treat the ore at the mine. Exposed in the mine and lying on the dump are several thousand tons of medium and low grade ore, which will not pay to ship to the smelters, but which, it is thought, it will pay to treat at the mine.

Some good ore is being sent from the Butcher Boy mine in Chesaw camp to the Granby smelter at Grand Forks, B. C.

Although several small properties around Chesaw are being worked in a desultory manner, the only active mines thereabout at present are the Bethel placers, the Olenyanti and Grant lode mines.

A staff of engineers is in the Cascade mountains checking up the work formerly done for the establishment of the international boundary by the United States government.

## CANADA.

### ONTARIO.

#### Cobalt.

Several important developments in the last few weeks in the Montreal River district have attracted the attention of investors and several important deals have been made or are now being negotiated.

While very little real development work has been attempted owing to the difficulty of raising money, in every case when shafts have been sunk depth has shown a great improvement in values and in most cases in width. The mineralized area has, within the last few weeks, been greatly increased by the discovery of silver in the Miller Lake district, 16 miles west of Elk lake. This new district has every indication of proving as rich as the Silver Lake section. Over 300 men have left Elk lake and several hundred claims have been staked.

Two 50-ft. shafts are being sunk on the Clinton properties at Silver Lake. Shafts are being sunk on the properties of the German Exploration Co. in James township. So far the sinking done has shown that values increase at depth in this section.

It is understood that the Moose Horn Mines Co. has disposed of sufficient treasury stock to provide for a liberal expenditure for machinery and development. The prospecting so far done has shown very encouraging results.

Shipments from this camp for the week ending July 18 were 500 tons, making a total for the year to July 18 of 10,415 tons. The shipments were as follows:

	Week July 18 Lbs.	Year 1908 Lbs.
Buffalo	.....	694,100
Drummond	.....	188,790
City of Cobalt	.....	600,250
Connaught	.....	437,790
Sh. Central (Standard)	.....	196,380
Cobalt Lake	.....	242,568
Cobalt Townsite	.....	128,220
Crown Reserve	44,000	141,681
Porter	.....	178,400
La Rose	.....	374,350
Little Nipissing	.....	91,347
McKinley Barrage	.....	1,741,820
Nancy Helen	.....	187,000
Nipissing	.....	253,600
Nova Scotia	40,230	311,775
O'Brien	63,870	2,366,107
Proctor	.....	151,660
Right of Way	60,050	420,530
Silver Cliff	.....	55,000
Silver Leaf	.....	197,300
Silver Queen	65,000	885,190
Temiskaming	.....	538,040
T. & H. B.	.....	575,920
Trethewey	121,640	1,091,450
Kerr Lake	.....	612,244
King Edward (Watlin)	.....	428,850

A new compressor plant will be installed on the property of the Argentite Cobalt, under lease to a New York syndicate. This property consists of 120 acres west of and adjoining the Silver Queen. Fifteen men have been employed since May sinking the No. 1 shaft, which was started by the old company. This shaft is now down 90 ft. on a vein of calcite and chalcopryite with small silver assays.

The new plant on the property of the Trinity Cobalt east of Cross lake is now in operation. The shaft, which is now down 32 ft., will be sunk to 100 ft. and drifting started from this level.

The control of the Vice-Roy Cobalt Mining Co. has passed into the hands of a syndicate of Ohio oil men, and active work will be started on the property of the company on lot 8, Con. 4, Coleman.

The financial statement of July 1, issued by the Nipissing Mining Co., shows an increase of about \$14,000 over the statement of April 1. The regular 35% quarterly dividend was sent to over 13,000 stockholders. While trenching on the property of the Nipissing lying within

the limits of the town of Cobalt several important discoveries have recently been made.

Two diamond drills are now being operated on the Short lake property of the Little Nipissing. At 280 ft. one of these drills cut a 4-in. vein of calcite carrying small silver values. At this depth the formation is still conglomerate.

## BRITISH COLUMBIA.

### Phoenix.

The new ore body recently opened up on the Brooklyn property of the Dominion Copper Co. is going to prove a valuable one. The Brooklyn ore carries higher gold values than any of the other Phoenix mines. Assays on the new lode give \$450 in gold, 50 cts. in silver and 2.25% copper. The new lead has been placed on the 80, 150 and 250 levels and about 150 ft. of drifting has been done on it. Crosscutting to ascertain the width of the find is now being done. The Dominion Copper Co. increased its shipments somewhat during the last week. Things are getting in better form every day at the Rawhide and when the price of copper warrants it will be possible to ship 1,000 tons per day from this property. The Dominion Copper Co. has about 500 tons of \$8 ore at the Athletan that is needed at the smelter for fluxing purposes. It has to be teamed two miles to the railway. The contract for this work has been let and shipments will begin at once.

The following record shipment of ore was made from the Boundary mines during the week ending July 18 and for the year to that date:

	Week Tons.	Years Tons.
Granby	21,741	682,483
Snowshoe	.....	267
Mother Lode	8,901	58,015
Oro Denoro	2,912	18,358
Emme	.....	15,666
Brooklyn	1,650	2,220
Rawhide	1,710	4,570
Sunset	576	1,608
Mountain Rose	50	155
Sully	19	99
Crescent	.....	50

The Granby Co. has added the Golden Eagle Fraction to its holdings. This property adjoins the Granby in the northern part of Phoenix camp. The consideration is said to have been about \$12,000. The Victoria shaft outlet on the Granby claims has cost that company over \$100,000 to complete, including the underground machinery for handling the ore, 3,000 tons per day of which can be loaded on either of the two railways running nearby. Several cars of the new blower machinery have arrived at the Granby smelter.

Assessment work is being done on the Silver Reef. The vein, which carries gold, silver and copper, is improving in value with depth.

### Rossland.

Some rich ore is being mined from the War Eagle-Iron Mask section of the Cons. Co.'s property in this camp. An average value for the large ore bodies of the camp was formerly from \$11 to \$14 to the ton, but 2,132 tons of ore from these two claims showed an average value of \$31 and returned the mine \$21.77 per ton. There is a big profit in ore of this

value under existing conditions at Rossland and these high-grade ore bodies will prove valuable assets to the mining companies.

The tonnage shipped from the camp during the week ending July 18 and for the year to that date was:

	Week Tons.	Year Tons.
Centre Star	.....	2,380
Le Roi	.....	1,050
Le Roi Two	.....	385
Evening Star	.....	35
Curlew	.....	30
Mayflower	.....	25
Bluff California	.....	95
Titus Bird	.....	145
Red Eagle	.....	20

The Evening Star lessees have things again in shipping order at their mine and are once more in the active part of the shipping list.

### Nelson.

Interest is still shown in the coming Sheep Creek district by outside capital and considerable eastern money will be spent on work in that district this fall. The general formation here is a stratified quartzite. The veins measure from 4 to 8 ft. in width, stand nearly perpendicular and cut the formation at an angle of about 26 deg. The ores are rich near the surface and change to sulphides and auriferous galena as depth is gained, in most cases still carrying their high values.

A mill will be erected on the Mother Lode property. Ore recently shipped from this mine carried \$125 in values. Work on the Queen, Kootenay Belle and Nugget is proceeding along regular lines and shipments of ore are continued.

Rich strikes of ore are reported from the Rambler-Cariboo, Hewitt and Vancouver mines. Only enough ore is being shipped from the Rambler to pay expenses at the present time.

James Cronin, late managing director of the St. Eugene mine and associates, have, it is said, disposed of the Yankee Girl and Canadian Girl claims in Ymir camp for a consideration of \$40,000. The property is a silver-lead proposition, the ore carrying considerable gold, and is considered one of the coming mines of this district.

An immense body of concentrating ore has been disclosed on the Kootenay Chief claim, which adjoins the well known Blue Bell. It is anticipated that the ore, which contains a large percentage of zinc, can be treated profitably by the new smelter at Nelson. The new electric smelter did not start operations as soon as was expected, but work will be begun a short while after the new pole line, now under way, is completed.

At the Whitewater mill good success is being met with in the making of lead and zinc concentrates.

Work is going on actively at a number of the smaller properties at Moyie. A new tunnel has been started on the Aurora across the lake from the St. Eugene. This adit will have to be driven 50 ft. to strike the first known ore body.

## MEXICO.

### Mexico City.

The Esperanza Mining Co., operating the Esperanza mine at El Oro, makes the

following report for June: The mill ran 28 days and crushed 12,554 dry tons of ore. One hundred and sixty-four tons of concentrates were shipped to smelter. The estimated realizable value of bullion produced was \$96,426; of concentrates 28,458. Receipts from rents and other sources were \$410. Total, \$125,294. Less working expenses, including development, marketing of bullion and freight and treatment charges on concentrates shipped to smelter \$97,461. Allowance for depreciation of plant \$2,500. Consulting engineers' fees and New York office expenses \$2,195. Net profit \$23,738. Practically all sulphide high-grade ore from the west veins has been extracted, and the new stopes in the northern section of the property on the San Rafael vein are not yet sufficiently opened up to produce much ore. Developments in that section of the mine from the sixth to eighth levels continue satisfactory. A new sulphide vein on the eighth level has been encountered in crosscut No. 26 west. A drift south on this vein shows it to be wider than the drift, the average value being 1½ ozs. gold to the ton. Ten-dollar ore is now being treated and will continue to be until the new veins are opened enough to permit of extensive stoping in that part of the mine.

#### Oaxaca.

Four more cars of machinery for the new mill on the Gneboche mine in the Ocotlán district have been received. Two of the cars were loaded with the electrical equipment for the mill.

The San José de Gracia Co., operating the San José de Gracia mine in the Sierra Juárez, has purchased one of the finest assay outfits in the state and has installed it at the mine.

The deed for the transfer of the Oaxaca smelter from the Oaxaca Smelting & Refining Co. to H. D. Wilde, representing the bond holders, was executed and recorded last week. The organization of the new company is going on rapidly and it has been announced that the smelter will be blown in as soon as completed.

The tunnel on the La Umbra mine in the Magdalena district has cut the vein. This is of greatest importance to the smelter as this property is being relied on to furnish the greater part of the lead ore. The tunnel is 1,800 ft. long. Drifting on the vein has been good and good values are being extracted.

#### Chihuahua.

The Greene Gold-Silver Mining Co. has suspended mining and milling operations at its Matuleta mine at Ocampo, presumably to facilitate the proposed consolidation of its properties with those of the Belen Gold Mining Co. in the same camp. According to reports, a strongly financed company has been organized to take over and operate these mines, which have a splendid production record. The Sierra Madre Land & Lumber Co., another Greene enterprise, is also to close down its large modern sawmill, on account of the impossibility of marketing its several million feet of sawed lumber.

The Rosario Mining & Smelting Co. is to immediately resume the work of erecting a 25-ton wood burning reverberatory

furnace at its property in the Urique camp. It is also the plan to erect during the year two 500-ton furnaces. H. S. Speed is superintending the work.

Shipments of ore are now in progress from the Florencia mine in the Santa Eulalia camp, operated by S. G. Burns and R. J. de Morambert.

The production of the Parral camp for the week ending July 11 consisted of 3,510 tons of smelting ore and 3,840 tons of milling ore. The June output was 31,525 tons, but it is probable that July will show a small decrease.

It is given out that the Veta Colorado Mining & Smelting Co. is to shortly complete the erection of its 500-ton cyanide plant in the Minas Nuevas section of the Parral camp. New York stockholders recently visited the property in company with H. H. Armstrong, a mining engineer of Butte.

The Sierra Plata Mining Co., operating in the Minas Nuevas camp, is contemplating the early purchase of heavy hoisting and pumping machinery. R. H. Allen is the manager in charge.

Preparations are being made for the early starting up of the Rio Tinto copper matting plant in the Terrazas camp. David Goodale is the manager.

The new smelting plant of the American Smelting & Refining Co. near Chihuahua was recently started up, two furnaces of 150-ton capacity each being blown in. Two other furnaces are also being made ready, but the date of their use depends largely upon the ore supply. At present writing, the plant is securing the bulk of its ores from the Santa Eulalia and Naica camps in this state. The continuous operation of this plant will revive mining in a number of camps in this and neighboring states.

H. R. Wagner of the executive board of the American Smelting & Refining Co.'s southern department, is in charge, assisted by manager H. S. Ege and Superintendent J. R. Enlow. The roasters have been in commission for several weeks and as the recent rains have furnished an abundant water supply, there is reason to believe that operations will be continued uninterrupted.

The Encinitas Mining & Smelting Co. announces that its Santa Rosalia smelting works will be put in operation this month. The plant has been completed for some time. R. J. de Morambert is the manager of this French-English company, which also owns mining properties in several camps of this state.

Messrs. Nesbitt and Mendoza have begun milling operations at the Barranca de Cobre mine in the Urique camp. Gold and silver-carrying copper concentrates of high grade are the product.

The newly formed Cia. Metalurgica Mexicana de San Luis Potosí, organized by R. S. Towne and New York associates, has begun development work at lately denounced properties in the vicinity of the Piedras Verdes copper mines in the Urique section. This same company recently purchased the Piedras Verdes a few miles from the projected extension of the Kansas City, Mexico & Orient railway.

Andres Pfeiffer recently made a shipment of ore from the Guadalupe property

in the Miñillas camp, about 25 miles northeast of Chihuahua city. This district has a number of partially developed but promising lead-silver properties.

T. A. Ripperdan & Co. are developing the San Mateo properties in the Uruachi district by tunnel. It is the plan of the operators to install a copper matting furnace of 25-ton capacity during the year.

#### Cananea.

C. L. V. Herrick of Kansas City, general manager of the Llano Copper Co., spent last week at the mine to inspect the work that has been pushed by Superintendent D. E. Bowers. Considerable pumping and hoisting machinery that has been badly needed was ordered by Mr. Herrick before he left.

On July 13 a definite decision was rendered by the federal court at Hermosillo in the case of the foreclosure of the mechanic's lien filed on the Las Cruces mill. The findings of the court were to the effect that both the mine and mill were the property of Stonifer Bros., who erected the mill and filed the lien because of the company's failure to pay them for their work. An effort will be made to sell the property, which is offered at \$15,000. The mill alone cost more than that and the mine is considered to be a valuable one.

It is authentically reported that J. D. McCarthy, of Mexico City, has bonded the Zambora property at Minas Nuevas, the bonding price being \$600,000. It is stated also that Mr. McCarthy has bonded the Quintera mines at La Aduna near the Minas Nuevas at \$1,250,000. These two, with a neighboring mine that he controls, are to be consolidated into one concern with ample means for operating and exploration.

The replacing of machinery in the power plant of the Black Mountain Mining Co. caused a partial shut down of that plant last week and for a time only 40 stamps were running in the Cerro Prieto mill. The new machinery has all been satisfactorily installed and the entire mill is now operating.

A company has been organized under the Mexican laws to take over about 50 pertenencias of well prospectured ground in the Santa Teresa mountains. Nearly all the denunciations included in this company's holdings were taken up on the strength of the antigua mine known as the Mina Grande, which is in the group. Gold is the principal metal, though it is claimed to carry considerable silver. The company is chartered as the Cielo Mining Co., with the following officers: S. D. Morse, president; J. H. Doty, vice-president; J. W. Davidson, secretary; A. C. Morse, treasurer. Charles Rice and each of the officers constitute the board of directors.

M. J. Thomas, general manager of the San Jose Gold Mining Co., with an adequate force of men has begun work on the property of that company.

The Mines Co. of America, controlling the Creco Colorado Co., with mines at Torreon, Sonora, makes the following report for June: The revenues were \$114,488 and the expenses \$68,865, leaving a net profit on the month's operations of \$45,223. A total of 12,000 tons of ore was produced.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring information on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The court appraisement of the properties of the Arizona Smelting Co. and the Consolidated Arizona Smelting Co., in the hands of receivers and for sale this month, amounts to \$1,165,417, of which \$335,000 represents mines and real estate and the balance smelters and similar improvements.

A judgment for \$25,000 was entered in New York July 23 against the Arizona Midland Mining Co. and the Vulture Development Co. in favor of Lloyd P. Hepburn on a note made by the Arizona Midland Mining Co. on Oct. 8, 1907, to the order of the Vulture Development Co. and indorsed to Hepburn.

William Pister of Cincinnati has been elected president of the Aurora Bullfrog Mining & Exploration Co. Other officers are: Edward G. Lutz, vice-president; D. C. Moore, secretary; C. J. Bertschy, treasurer. The directors in addition to the above are: R. H. Vaughn, William Fern, I. C. Ehlering, William H. Doudworth, D. C. Cheney, Oscar Klein, B. H. Brunswick and William E. Burke.

The federal grand jury in Chicago on July 23 indicted the following officers and backers of the American-Mexico Mining & Developing Co.: William S. Phillips, J. B. Swalley, A. T. Grove, Mark Sherwood, Walter A. Billon, W. S. Arms, William K. Graham, and H. E. Graham. All charged with using the mails to defraud. Other corporations owned by the same promoters are the American-Mexico Mining Co., capitalized at \$3,000,000; Consolidated Mining Co., \$3,000,000; and Republic Mining Co., \$1,000,000. These concerns secured an option upon the La Roca mine in Mexico.

The Boston Stock Exchange has stricken from its list 185,800 shares of the Montana Cons. Coal & Coke Co., more than a majority having been deposited under a circular dated June 3, 1908. Temporary stock trust certificates of the company countersigned by the Puritan Trust Co., agent for the trustees, are admitted to quotation on the unlisted sheet. Certificates printed on safety paper of the American Banknote Co. will be good delivery only. The Montana Cons. Coal & Coke Co. is being reorganized and re-financed. New money to the amount of \$100,000 has been raised and the stock placed in a voting trust. The trustees are Samuel H. Hudson, member of the Boston law firm of Hudson & De Goosh, and H. C. Bryan, a New York lawyer. The trustees are at present on a visit of inspection to the property and upon their return more definite information as to the future of the property can be obtained. The directors, virtually appointed by the trustees, are William J. Kurth, Arthur W. De Goosh, Samuel M. Child, H. M. Burton and J. N. Lovell.

## Official Reports.

### PIPPINISS MINING CO., LTD.

The financial statement, dated July 1, shows cash in bank and bullion on hand, \$705,400; ore in transit and at smelters, \$109,026; ore sacked at mine ready for shipment, \$112,235; total \$926,731.

### PITTSBURG OIL & GAS CO., PA.

For the quarter ending June 30, the sales of gas amounted to 253,550,000 ft., and of oil to 116,351 bbls. The receipts were: Gas, \$74,060; oil, \$159,032; other income, \$11,849; total, \$211,941. Deducting expenses and interest leaves net earnings of \$91,341, which were disposed of as follows: Reinvested, \$3,150; and applied to reduction of debt, \$88,191; profit and loss surplus on June 30 was \$91,345. The company earned at the rate of 6½ per annum on its outstanding stock.

### CALUMET & HECLA MINING CO.

During the fiscal year ending April 30 last there was produced mineral equal to 12,264 tons of refined copper. The product of refined copper was 39,400 tons. The price obtained varied from 26 to 12 cents per lb., permitting the payment of four dividends amounting to \$50 per share or \$4,000,000 on the authorized capitalization of \$2,500,000.

The assets at the end of the year were: Cash at mine, \$182,071; cash at New York, \$15,000; cash at Boston, \$1,188,352 (including copper at 13 cents per lb. and mineral at 7 cents); development and equipment fund, \$554; insurance fund, \$959,724; bills receivable, \$659,018; total assets \$6,295,719.

Liabilities were: Drafts in transit, \$112,150; bills payable, \$1,225,518; employees' aid fund, \$5,617; notes of Keweenaw Association, \$250,000; profit and loss surplus, \$4,709,965; total liabilities, \$2,265,719.

President Agassiz reports in part as follows:

In several of the previous annual reports, attention has been called to the unsatisfactory character of the conglomerate below the 57 level in the northern part of the mine. In 1900, the year before Mr. MacNaughton became general manager, the conglomerate yielded about 59.93 lbs. of copper to the ton. Since then this percentage has annually been diminishing. For the past fiscal year its yield was 39.68 lbs. To maintain its product the company has stamped an additional amount of conglomerate rock in addition to the amygdaloid mined from the Osceola lode which has been increased from 74,235 tons in 1905 to 603,891 tons in 1907-08. The amount of conglomerate stamped has gradually increased from 1,164,607 tons in 1900 to 1,894,176 tons in 1907-08.

During the last five years the cost per

ton of rock has been greatly reduced, partially offsetting the decrease in the copper contents of the rock.

On the Osceola lode the openings have been pushed as rapidly as practicable, and continue satisfactory. During the fiscal year this lode has yielded 11,145,220 lbs. of copper, and is now producing at the rate of over 12,000,000 lbs. a year and this is being gradually increased to offset as much as possible the decrease in production from the conglomerate lode.

On the Kearsarge lode work has been temporarily suspended at Nos. 19 and 20; the openings are now limited to sinking No. 21 shaft; the character of the lode there is good.

The new foundry has been in commission since last July; from its operation our saving approximates \$20 a ton for the company's castings.

Under the terms of its option the company has acquired 50,100 shares of Gratiot Mining Co.

The company has abandoned its option on the Pointe aux Mines, Canada, but is continuing the examination of the Mainville lands. Exploration work on the Sibley lands near the Nonesuch has thus far been satisfactory. The lands to the east of the Nonesuch are being explored with fair results.

The expenditures of the aid fund during the fiscal year amount to \$65,171. The value of the aid fund at cost is \$125,729.

The evidence for a final hearing of the suits against this company as a shareholder in the Osceola Co. has been taken and printed. Arguments were heard by the courts on this evidence in May. The issues in these suits remain unchanged but the amendment by the Michigan legislature of the law which limited land holdings of mining companies, has made that question unimportant. The continuance of the injunction forbidding the Osceola Co. to hold its annual meeting except to adjourn the same until the final decision of the suit of the president of that company against it and this company, has prevented the Osceola shareholders from choosing their officers (although a majority of the shares are held by persons not parties to these suits) and the management has remained unchanged. The annual report of the Osceola directors for the year ending Dec. 31, 1907, shows a profit of \$722,755, from which a dividend of \$673,050 was paid for the first six months, leaving a surplus of \$19,505. No dividend was paid for the last six months of the year.

The Calumet and Hecla Mining Co. owns: 42,978 shares of the Althouse Mining Co., of 100,000 shares issued; 16,080 Centennial, of 20,000 shares issued; 20,000 Frontenac, of 20,000 shares issued; 50,100 Gratiot, of 100,000 shares issued; 140,050 La Salle, of 302,977 shares issued; 12,000 Manitowish, of 20,000 shares issued; 22,671 Osceola Cons., of 96,150 shares issued; 50,100 Superior, of 100,000 shares issued; 35,150 Dana, of 10,000 shares issued; 36,100 St. Louis, of 40,000 shares issued; 1,900 Laurium, of 40,000 shares issued, and 891 shares of the Seneca Mining Co., of 20,000 shares issued.





## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise.

(See also Market Reports)

[illegible]

### Latest Quotations on American and Foreign Mining Stocks.

**Copper, Gold, Silver, Lead, Zinc, Quicksilver.**

<sup>1</sup> Dividend Payers, (i) Levy Assessments.

[illegible]

[illegible]

### Capitalization and Dividends of U. S. Mines and Works.

Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies.

[illegible]

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\* Illustrated

## Injury to Mining by Forest Fires.

Again the mining public and civilization in general has been shocked by a great disaster that has resulted from a supposedly harmless forest fire. This time the appeal for sympathy comes from the Crow's Nest district in the Kootenay valley of British Columbia, where bush fires which originated in the Elk River valley country some weeks ago, have recently caused the loss of many lives, made homeless thousands of people, and destroyed property of enormous money value. Among the greatest sufferers are the towns of Fernie, Coal Creek, Hosmer and Michel, where coal mining and the lumber industry were the main supports of the population.

So rapid has the fire been spreading that some apprehension is felt over the possibility of greater damage being done by continuing across the Canadian border into Montana.

Montana has valuable forest reserves, and if a fire like that which has devastated certain sections of British Columbia should occur the loss would be incalculable. To deprive the famous copper camp of Butte alone of lumber for its mines would be a calamity which would be felt throughout the world—by the consumers of copper, the people whose money is tied up in the mining industry, and of those whose very existence is dependent upon Butte.

Fortunately for Butte and for all Montana, precautions are being taken to protect the forests and fight the fires that would destroy them. The forestry department is having trails cut through the Bitter Root reserve and other thickly wooded sections in order to facilitate the work of the forest rangers in checking a fire. Incidentally these roadways will aid miners, prospectors and travelers generally who may wish to visit the remote sections of Montana within the boundaries of the forest reserves.

Bush fires are often started through the carelessness of campers on their periodic outings. Montana has a law which imposes a fine of \$5,000 or imprisonment for two years, or both, if a fire is started maliciously, and a fine of \$1,000, or imprisonment for one year, or both, if a fire results from carelessness. Notices to this effect, in English and foreign languages, are posted throughout the mountains, and the money collected from violators of the law is used for educational purposes in the county where the offense has been committed.

The precautions to be taken under the Montana law are: (1) Not to build larger camp fires than are necessary. (2) Not to

build fires in leaves, rotten wood or other places where they are likely to spread. (3) In windy weather and in dangerous places, to dig holes or clear the ground to confine camp fires. (4) To extinguish all fires completely before leaving them, even for a short absence. (5) Not to build fires to clear land without informing the nearest officer of the forest reserve so that he may assist in controlling them.

What has been said about Montana may be appropriate in other mining states, especially where the timber supply is nearing exhaustion by reason of the larger consumption. The policy of allocating a certain proportion of the earnings of a mine or other property to a reserve fund to cover eventual loss by fire is commendable. Many mining companies have already laid up a sum sufficient to offset the possible damage by fire. One enterprising corporation—the Calumet & Hecla Mining Co.—has created an insurance fund of \$869,724.

It would no doubt be politic for the lumber and mining interests owning their own timber lands to keep in their service men whose duty it should be to watch for signs of fire and to extinguish the fire immediately, no matter how trivial it may seem. There should also be a proper fire brigade in camp to answer the call for help of the watchmen. In this way the small bush fire would not become the demon of widespread disaster that it is now, and the cost of checking the fire would be a very small fraction of the interest that could be earned on the money loss resulting from a big conflagration.

## Duty of Directors.

If we attempted to take a census of the successful mining companies for the purpose of studying their sociological characteristics as they have developed since organization we would no doubt learn that the services of more than one sculpture of creditable reputation is necessary to shape the crude stone of adversity into the marvelous monument of progress and prosperity.

The embryonic state of a mining property, like the infancy of a child, may, and often does, cause apprehension of a kind that will test the intelligence and power of endurance of those who are expected to direct and mold the future of their dependents.

The destiny of a mine, as of a child, may be illustrious or infamous, according to the wisdom and ability of the manager or director, parent or guardian.

Wealth, if properly used will be uni-

versally beneficial; if handled by an unscrupulous distributor its harm is far reaching. To expend enormous sums of money for machinery for a mine that has not enough ore in reserve to pay even the interest, to say nothing of repaying the principle, is often willful deception practiced on the confiding investing public. Likewise, teach a child extravagance and the fruit at maturity will be an indigestible product for society at large.

Error in judgment in selecting a means to overcome certain difficulties encountered in the treatment of a refractory ore is often as great a handicap to the successful working of a mine as is the lack of capital. And when a prospect develops into the mine it needs more intelligent, economic management to maintain the standard of excellence that means profit even from the so-called waste products.

The touchstone of permanent success of a mining company is not always, as the inexperienced are led to believe, the fame of a "model" board of directors, among whom may be the elite of politics, the church, finance and commerce.

To expect these men of eminence by public consent to understand the complex management of a mine immediately upon their signing the register of directors would be anticipating a miracle. It is safe to say that in the majority of cases these gentlemen have a meteoric career in mining; they are heard from just so long as their names have a pecuniary value in floating the company, or later when reorganization and refinancing are necessary.

Some "honorables" do not seem to object to lend their names as often as the enterprising company promoter wants a magnet to attract investors. The practice is generally so remunerative to the peddler or professional director that there is a possibility of competition in this direction. Some polite people would say this system is another form of graft for the man of public affairs.

Opinions with regard to the duties of directors vary perhaps as widely as the thermometer in the four seasons of the year; but one thing is certain, a director to be a director in the full sense of the word is under the moral obligation to look out for the welfare of stockholders. Because a director is an aristocrat by accident of birth, or a captain of industry by the approval of a group of financiers, does not exempt him from performing his duty on the board of the mining company. No matter what their pay—in stock or cash—directors of mining companies are in duty bound to render equitable service.

### Future of the Calumet and Hecla.

Geologists and mining men generally who are interested in calculating the longevity of mines, especially copper properties, have recently been given a problem by President Agassiz of the Calumet & Hecla Co. The information was contained in the testimony in the Bigdow-Calumet & Hecla suit, which seeks to prevent the control of the Osceola by the Calumet & Hecla Co.

President Agassiz said—and the statement is corroborated by General Manager MacNaughton—that the life of the Calumet & Hecla mine on the conglomerate lode cannot be assured beyond 15 years. As to the life of the mine, the surprising statement is made that it may be between 10 and 15 years. To be sure, the latter statement will be modified somewhat by the amount of ore mined and the percentage of copper it contains.

This interesting testimony recalls the activity of the management of the company in acquiring control by purchase of stock in certain properties, including the Osceola Consolidated, Centennial, Allouez, La Salle, and others of known value. It is hoped, said President Agassiz, that these properties will develop a sufficient amount of copper to make up the diminution in the Calumet & Hecla mine.

The Calumet & Hecla Co. was organized in 1871, with a capitalization of \$2,500,000, in shares of \$25 par, of which \$12 per share was paid in when the mine began to earn expenses. The charter was renewed in 1900 for 30 years, and amended in 1903, under the new laws of Michigan, making the corporation a securities holding company as well as a mining and smelting concern. The dividends paid to June 25, 1905, amount to the enormous total of \$106,850,000, equivalent to \$1,068.50 per share that had a market value on Aug. 4 of \$865, placing a value on the properties comprising the Calumet & Hecla corporation of \$20,200,000.

The production of copper from 1871 to the close of 1907 by the Calumet & Hecla mine alone was approximately 1,003,453 short tons. The production for 1907 was 88,000,000 lbs., or 44,000 short tons.

Lake copper was worth 21½¢ to 27¢ cents per lb. in 1871, and a year later touched 44¢ cents. In 1885 the price dropped to 9.80¢ cents, and in 1887 fluctuated between 9.95¢ and 17¢ cents. In 1894 there was a slump to 9¢ cents, the lowest price on record. In 1899, the combination year, the market turned upward, touching 19¢ cents, but

in 1902 there was a drop to 11¢ cents. Thereafter prices continued to advance until in 1907 they tipped the scale at 26¢ cents, the highest for 34 years. In the current year, the extreme quotations have been 12¼¢ to 14¼¢ cents, closing on Aug. 5 at 13¼¢ to 13½¢ cents.

The record of Calumet & Hecla during the past 36 years has been unique in copper mining, and if the old property shall yield within the next 15 years only part of what it has in the past 15 years, the shareholders, though few in number, can truthfully testify to the fact that mining is not as great a gamble as certain people would have us believe.

To return \$89 for \$1 on the paid-in capital stock of a mine whose product is worth cents per pound and not dollars per oz., would make even King Solomon envious of America as a source of great mineral wealth.

Scientists, notably chemists and geologists, have been rather active of late in coining names for supposed new discoveries, with a view invariably of perpetuating the memory of the finders or some great men. Sometimes the new names denote the localities in which the discoveries have been reported, or they suggest a combination of the primary products that constitute the mineral or element christened. The ingenuity shown in this direction is often welcome, provided the name chosen for the discovery does not prove to be an infraction on common sense. When, however, a writer undertakes to adapt a word with a meaning contrary to what he intends, for the purpose perhaps of being "original," then there is reason to question the wisdom of his literary ingenuity. For instance, while reading a British colonial-mining report we have come across the peculiar expression "tin lives in the deep ground." Were the "t" in "tin" capitalized it might suggest the nickname of a coolie laborer whose habitat was in the mine. But to infer that tin ore, which ordinarily requires crushing and smelting to put it in condition to be manufactured into a form which will permit the handling that creates the noise which resembles a superhuman voice "lives in the deep ground" is amusing.

The West African gold output for the six months ending with June amounted approximately to 141,149 fine ozs., valued at \$2,917,570. Compared with the production for the corresponding period of last year, there is shown an increase of 2,862 ozs., or \$58,163.

# The St. Louis-Montana Cos.' Apex Litigation.

By MATT. W. ALDERSON.

A bitterly fought legal contest, extending over 19 years, with the litigants back



MATT. W. ALDERSON.

at the point from which they started, is the record of the suit between the St. Louis Mining & Milling Co. of Montana vs. Montana Mining Co., Ltd. The St. Louis Co. drained its treasury years ago and maintains itself today by assessments on its stockholders. The Montana Co. in its last report to its stockholders says: "Our tailings are exhausted, the property itself is valueless, with the exception of the ore in the compromise ground." In the report for the year previous the company showed a revenue of \$16,199.89 from ore taken out by leasers with an expenditure of \$26,911.12 for milling, payments to leasers and administrative charges and \$13,385.14 for litigation expenses, taxes, etc. As a partial offset to this unfavorable financial showing there was a profit of \$22,105.84 from treatment of tailings that year. The company has, however, a reserve of about \$150,000 and a property in Nevada which has been paying a profit of a few thousand dollars a year. But it will be apparent that its resources will be at a low ebb by the time decision on the present suit can be had from the Supreme court of the United States.

English stockholders of the Montana Co. inveigh against the apex law; and prominent writers, who are not favorable to the law, cite the suit against this company as an instance of the trouble that may ensue between conflicting interests because of such a law. But one of the peculiarities of this suit is that on part of the ground there is a divided apex—that is, the vein apexes on ground belonging to both parties in interest. Under the law of vertical boundaries such ground could not be worked without conflict unless a spirit of fairness was exhibited by both sides; and it is lack of this feeling on one side or the other that leads to the beginning of every lawsuit. One person cannot maintain a controversy, neither can one of the parties thereto bring one to a close, unless by complete surrender. There must be on both sides a disposition to concede something, if necessary—to do what is fair in the matter, to bring any legal contest to a close; and, with this feeling actuating the parties, there will be no quarrel, whether the law grants the right to follow a vein where it leads or cuts it off at the side by a vertical boundary.

Montana has been the battlefield of the most severely fought legal contests in mining matters, and it is a peculiar fact that, while decisions of the lower courts have been such as if acquiesced in would have settled the litigation, the decisions of the court of final resort have been frequently such as to give it new life.

The general supposition is that courts

*A peculiar case in which a 30-ft. strip has been granted the usual apex right and a vertical right, also.*

*After fighting 19 years, at great expense, the litigants take a fresh start, each confident of final victory.*

of law are for the purpose of determining the equitable rights of litigants; but the person of experience or extended observation is well aware that courts are for the benefit of attorneys. In an important suit the attorneys on both sides watch every point. Decision is rendered in favor of one side. This decision on appeal to higher court is affirmed. It is reasonable to suppose that the court of final resort will give a similar decision. In this emergency the attorneys for the losing side puzzle their wits to find some technical point on which they may concentrate their fire. Going before the court

the services of its general manager the directors say: "But he has unfortunately for some years been qualifying as an expert in our litigation. \* \* \* We could not dispense with Mr. Burrell's services even if we desired to do so. He is too valuable to us in many ways for us to contemplate that possibility." So we see here a company kept in existence and its officers paid their salaries because of litigation. In this case things were not purposely so shaped, but undoubtedly some litigation between companies is prolonged for the benefit accruing to employees of one or both of the litigants.

The result of litigation of a prolonged nature, involving decisions of an intricate character is oftentimes quite interesting, when the results are so placed before us as to show their true meaning. To get this we need to have a knowledge of all the facts.

The St. Louis lode claim was located by Charles F. Mayer Sept. 28, 1878. The Nine Hour was located in 1880. At a later date, when the owner of the St. Louis claim applied for patent, an adverse was

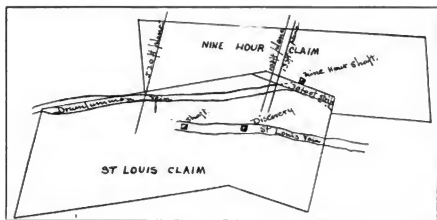


Fig. 1. Showing Surface Lines of 30-ft. Strip.

well prepared on this one point, they succeed in getting a decision which virtually means that all the work of the past has to be done over again. It was thus in the Heinze-Amalgamated litigation. It is thus in every murder trial, where the murderer or his friends, have means to carry on a legal fight interminably. It has been thus in the litigation between the St. Louis and Montana companies, and it will continue to be thus while there are lawyers who are good fighters, ambitious to show their skill, and who are face to face with the necessity of earning a living.

As a general rule lawsuits can be settled out of court for one-tenth of the cost of carrying them through. But each party thinks he is in the right, becomes set in his opinions and refuses to think of yielding. If the Montana Co. had paid the first judgment against it, it would easily be \$100,000 ahead at the present time. Today it says in its annual report that but for this litigation "we should long since have closed all operations at Marysville." Again, to the suggestion that it dispose of

filed. In 1884 a compromise was effected whereby Charles F. Mayer agreed to deed to William Robinson, James Huggins and F. P. Sterling, owners of the Nine Hour, what is now known as "30-ft. or compromise strip." This bond provided a penalty of \$1,500 for forfeiture and Mayer sought, after obtaining his patent, to preserve his claim intact by paying this forfeiture. He acquired two-thirds interest in this bond—the rights of Huggins and Sterling—but the Montana Co., which in the meantime had acquired the Nine Hour, brought suit as owner of said claim for specific performance of contract, and Mayer learned that he must make deed—the forfeiture didn't cut any figure. Under order of the court, deed was given by Mayer to the Montana Co., the deed containing the words "and all the mineral therein contained," an expression that was in the bond.

Very naturally the inquiry is made why Mayer, being the senior locator, should have compromised with a later locator, who had overlapped on his ground. It



seems that Mayger in locating his claim had unintentionally staked larger than the regulation 900 by 1,500 feet. The decisions of the courts at that time were to the effect that staking a location too large had a tendency to make the location voidable. In knowledge of the fact that those advising him would raise this point Mayger thought best to compromise.

In 1889 the St. Louis Co., which had acquired the rights of Charles F. Mayger, applied to the courts for an order of survey to investigate the underground workings of its neighbor, the Montana Co., in the Nine Hour, to ascertain if the Montana Co. had trespassed on the rights of the St. Louis Co. This case was practically the beginning of the present suit. After four years of litigation, the case reached the Supreme court of the United States, where decision was given in favor of the St. Louis Co.

Following a survey, the St. Louis Co. brought suit against the Montana Co. for trespass, not for removal of ore from its discovery vein, but from a vein on its side line, the Drumlunnon vein (see Fig. 1). In this suit the St. Louis Co. was limited in its claims by the court to such portion of the vein as had its entire apex in the St. Louis location. (See Fig. 1, ground between 133-ft. plane and 520-ft. plane.) Judgment was rendered in favor of the St. Louis Co. for \$23,269. From the decision of the court both sides appealed, the St. Louis Co. from the ruling which declared it from any claim where a part only of the apex was on its ground and the Montana Co. from the judgment for damages. The decision of the highest court was eventually the same as the ruling now recognized as standard.

"The senior location takes the entire width of the vein on its dip, where the apex of such vein is partly within two or more adjacent lode mining claims."

The result of this decision was that the case was remanded for new trial. At this trial, commenced in 1905, judgment was rendered in favor of the St. Louis Co. for \$195,000. This judgment was affirmed by the Court of Appeals. The Supreme court of the United States, however, decided that the deed given by Mayger to the Montana Co. was in effect a common law deed, because of the expression "and all mineral therein contained," and that the Montana Co. under this deed was entitled to all ore vertically beneath the surface of the compromise strip, regardless of where the apex of the vein might lie. The court ruled that the deed was "the granting of a section of a vein of mineral"; that "it does not operate to transfer the vein in toto, but simply carves out from the vein the section between the vertical side lines of the ground and transfers that to the grantee."

Acting on this decision, the St. Louis Co. has filed an amended complaint asserting its claim to all ores on the vein apexing in the St. Louis ground, after passing on its dip through the 30-ft. strip into the Nine Hour ground, this portion of the vein having been staked out by the Montana Co. Damages are set at \$1,000,000.

The sketches herewith give a clearer idea of the situation. Fig. 1 gives the surface lines of the conflicting locations.

Fig. 2 shows the two rights that the courts have decided belong to the 30-ft. strip. Under the decisions of several courts the strip was decided to be a part of the Nine Hour claim and to have the usual right—that is, the right to go down on the hanging wall side of the vein apexing in the St. Louis claim. Under the decision of the Supreme court it lies, in addition, a vertical right. The Montana Co. has all along fought for this vertical right with the idea that it would completely shut out the claim of its neighbor; but the sketch shows clearly how it does not do so, as the vein apexing in the St. Louis Co.'s ground and going down at an angle of less than 60 degrees passes out of the 30-ft. strip into the ground the title to which has not been passed. Under decisions of the Supreme court the owners of the St. Louis could not cross through this vertical strip into a vein in the Nine Hour ground which had its apex on the St. Louis location, and there might be some

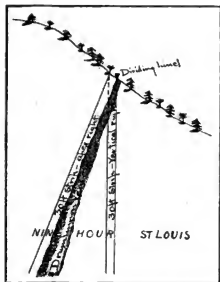


Fig. 2. Showing Apex and Vertical Rights.

question of right of way through the vertical strip, following the vein; but, having access to the ore after the side line of the strip was passed, its right would be indisputable. The decision of the Supreme court, while adding to the intricacies of the case, and giving surveyors and experts a job to figure out boundary lines and values, practically carves from just below the apex a 30-ft. section from one corner of the claim made by the St. Louis Co. against the Montana Co., and, while the decision itself is comparatively insignificant—that is, as far as it affects the real merits of the case—it gives the litigants a chance to spend \$100,000 each fighting the same battle over again.

**Chilean Imports.**—In 1907 the imports of Chile included \$3,651,192 worth of mining machinery and apparatus, \$6,730,961 in industrial (manufacturing etc.) machinery, \$4,113,160 in locomotives, \$1,019,913 in scientific and other instruments, \$12,797,033 in iron and steel. In all \$21,366,212 worth of mineral products, and \$17,169,219 in machines, instruments, tools and apparatus were imported in 1907.

## Mineral Wealth of Oklahoma.

BY C. E. SIENKOWSKI.\*

If the mineral resources of a State are the foundations of its prosperity Oklahoma should have before it a brilliant future, for the lead, zinc, oil, gas, coal, Portland cement materials, building stones, and artesian waters that occur in its northeastern portion could scarcely be surpassed as bases for industrial greatness.

The area covered by the writer, a strip extending 81 miles in an east-west direction and 101 miles from north to south, includes the northeastern part of the Creek nation, practically the whole of the Cherokee nation, and all of the Seneca, Wyandotte, Ottawa, Shawnee, Modoc, Peoria, and Quapaw reservations.

The lead and zinc deposits now known occur only in the northeastern part of the area visited. The deposits of the Peoria district, in which the mines were opened nearly 20 years ago, have first place, and those of the Synmore, Creek, Quapaw, and Miami districts follow, the mines of the Miami district being less than a year old.

Areas that have yielded oil and gas are the Afton-Cody's Bluff or "shallow sand" field, the Bartlesville or "deep sand" field, and the Glenn "pool," near Kiefer. Smaller pools lie between the Bartlesville and Glenn fields, in line with them, at intervals so close as practically to constitute a continuous field from Kiefer to the Kansas line. New but promising areas are the Delaware, Hogshooter, and Morris-Baldhill fields. There are many other outlying areas, most of them gas bearing.

Most of the coal beds of the district are thin and not of great linear extent, but several have been worked to supply a market that is more than purely local.

The rock formations of this section of the state include an alternating series of limestones and sandstones with intervening shale, the whole dipping gently to the north of west. As the limestones and sandstones are harder than the shale and thus offer more resistance to weathering, they tend to form low, gentle westward slopes, with steeper eastern slopes of shale, the harder rock coming to the surface along the crest of the ridge.

Where the rock is limestone that has been protected from weathering by a thin covering of shale the essential materials for cement are found in a favorable position for sites of cement plants. Where, in addition, adequate supplies of fuel, especially natural gas, and good transformation facilities are available, the climax of advantageous position for cement manufacturing has been reached. The rapid increase in the number of cement plants in adjoining parts of Kansas is due to just such a fortunate combination of advantages, and it can scarcely be doubted that a like development will take place in eastern Oklahoma.

The area is well supplied with building stones—limestone, sandstone, and granite. Rock suitable for supplying small local demands can be found anywhere.

\*Extract from Economic Bulletin No. 540, U. S. Geol. Survey.

# Method of Assaying Silver Bullion at Indian Mint.

By F. T. C. HUGHES,\*  
Assayer.

Briefly, the process consists in dissolving the assay pieces, or "musters," as they are locally called, in nitric acid, precipitating with hydrochloric acid, and estimating the fineness of the bullion gravimetrically by the weight of chloride of silver formed.

Before giving a detailed description of the process, a few words regarding the bullion which comes into the mint, and the method of sampling it, may be of interest.

Silver is received for coinage in the mint in the following forms:

(a) Bars of fine silver (996 to 998 fine) from London, the Continent and America.  
(b) Mexican dollars, which assay about 962 to 963 fine.

(c) Chinese "Sycee" silver, in the form of ingots shaped like shoes, which usually (d) Uncurrent coins (rupees, etc.), which are withdrawn from circulation; also marked, defaced, and soldered coins.  
(e) Some native "high touch" silver coins, from native states, etc.

Except in the case of fine silver of known values, and sometimes dollars, all bullion received is first melted up, and assays are made from a sample dipped out and granulated by pouring into water. On the report of these assays, the required amount of copper or fine silver is added, according to an alligation table, and the standard silver alloy is prepared by melting up the metal so prepared in large plumbago crucibles.

These pots of "standard meltings," as they are called, are sampled by taking a dip after the pot has been well stirred and granulating the metal extracted by pouring into water. Experience shows that this is the best method of obtaining the average assay value of the pot, as the ingots obtained after pouring into the molds vary in fineness in different parts, the metal never being absolutely homogeneous.

To allow for refining the silver in the course of minting, especially in the operations of annealing and pickling, the standard bars are alligoted to 916.1 for rupees and half rupees, 915.9 for quarter rupees, and 915.8 for one-eighth rupees, instead of 916.66, which is the standard alloy.

The work of the assay laboratory consists in assaying and reporting on:

(a) All commercial silver brought by government for coinage purposes.

(b) Silver residues which are worked up from drosses, etc., and are refined in the mint.

(c) Standard meltings, which have been prepared by mixing the correct proportions of silver and copper to form the standard alloy.

(d) The coins after minting and before issue to the currency office.

(e) Gold bullion which is occasionally received in the mint. Analyses of counterfeit coins for the police, bronze and nickel analyses, and other miscellaneous work of this description are also undertaken in the assay laboratory.

*The only assay laboratories where this method is systematically carried on. Method used successfully for over 50 years. Forms in which silver is received by mint. Checking assays of bullion.*

*Suggested change in weighing. Metals which interfere with accurate assaying, and how to detect them. Apparatus employed.*

In this paper the method of assaying silver bullion only will be described.

As this method of assay depends on the weight of the cake of silver chloride produced by operating on a fixed weight of silver, it was first necessary to fix on a convenient weight of the chloride which would represent 1,000 parts of pure silver.



FIG. 1.

FIG. 2.

FIG. 3.

Fig. 1. Acid Bottle.

Fig. 2. Wedgwood Cup for Drying Chlorides, with Porcelain Saucer.

Fig. 3. Acid Pipette.

This was fixed many years ago at 25 grs. The weight of pure silver corresponding to 25 grs. of silver chloride, called the assay pound, has been very care-

fully determined, the weight of the assay pound has been fixed at 188.21 grs.

The assay pieces (musters) are all adjusted by skilled weighmen exactly to this weight, and (except in the case of single coins, and the melted coins, which are done in triplicate), are made in duplicate.

The musters are placed on trays in small numbered copper saucers, and are then checked by the assay master or his deputy, who transfers them from the pan of his balance to the bottles prepared to receive them. (See Fig. 1.)

Each bottle has its own number permanently engraved on it, which corresponds with the assay number. A native assistant brings them into the balance room in trays containing 20 in each. After the musters have been weighed into them, the bottles are carried to the laboratory and 1½ drams (5 c. c.) of nitric acid (specific gravity 1.250) is introduced into each by means of a pipette (Fig. 2). Solution is assisted by placing the bottle on a hot plate covered with asbestos felting under a hood.

When this is completed the nitrous fumes are removed by blowing into the bottles through a piece of glass tubing, and the bottles are removed from the hot plate to the turn table. About 5 ozs. (150 c. c.) of cold distilled water are introduced into the bottles by the aid of a rubber tube with a nozzle attached, which is connected with the distilled water supply; then 1¼ drams (5 c. c.) of hydrochloric acid (specific gravity 1.075) are added by the aid of a pipette similar to that used for the nitric acid.

This quantity of hydrochloric acid is considerably more than sufficient to precipitate all the silver. The bottles are now stoppered and allowed to stand for a few minutes, after which they are vigorously shaken by hand till the silver chloride aggregates and leaves a clear supernatant fluid. All specks of chloride adhering to the stopper or sides of the bottle are washed down by a twist of the hand; the stoppers are removed and placed on the mtrn table near the corre-

TABLE SHOWING HOW P.Y.X. COINS ARE ASSAYED.

Denomination of Coins.	Number of Single Coins Taken.	No. of Coins Melted and Granulated.	Explanatory Remarks.
Rupees.....	10 from each lakh (100,000)	20	One assay made from each single coin by punching out centers of rupees and halves, and by rolling out and cutting up quarters and eighths.
Half rupees.....	10 from each day's coinage.....	40	
Quarter rupees.....	10 from each day's coinage.....	100	Assays of granulated sample made in triplicate.
Eighth rupees.....	10 from each day's coinage.....	200	

Note.—The local remedy for rupees and half rupees is two parts per mille above or below standard. For quarter and eighth rupees three parts per mille above or below standard.

fully calculated, and these calculations have lately been revised by Colonel Milne and Major Bourke of the Bombay assay office. After making all physical corrections, such as allowances for the different densities of silver, silver chloride, and

sponding bottles in such a way that the wet portion does not come in contact with the support.

Each bottle is next nearly filled with distilled water let in with a good rush to stir up the chloride aggregated at the

\*Abstract of paper read before British Inst. of M.E. & Met., Feb. 25, 1908.

bottom; the stopper is then replaced, and the chloride allowed to settle evenly at the bottom of the bottle.

To allow of complete settling of the chloride the bottles are left standing for one hour, and the fluid contents are then siphoned off by the assistant assayer, until only about 1 in. of liquid remains at the bottom of each bottle. In this manner the bulk of the base metals originally present in the alloy is removed. The bottles are again filled with distilled water, the stoppers again wetted and inserted, and the chloride again settles to the bottom.

In the ordinary routine of the laboratory the assay is only carried thus far in one day, the remaining operations, namely, those of potting, drying and weighing out the chlorides, being left over till the next morning.

The stoppers are then removed, the bottles inclined and tipped so that the chloride may collect on one side, and are taken to a trough containing rows of small Wedgwood cups (called pots), which stand on white porcelain saucers (Fig. 3). These pots are numbered similarly to the bottles, and the trough is filled with distilled water.

The mouth of each bottle is quickly inverted, covered with the finger, and introduced into the trough through a brass double clip, so that it hangs mouth downwards over the Wedgwood cup. The finger closing the mouth of the bottle is removed under water before any falling particles of silver chloride can touch it, and the precipitate is now free to gravitate into the cup through the water filling it. The bottles are tapped and turned until every particle of chloride has fallen into the cup.

When the chloride has completely left the bottle the finger is again placed over the mouth of the bottle under water, and it is removed from the trough. At this stage the bottles are carefully examined to see that no silver chloride remains in suspension.

The pots are taken out of the trough full of water with the chloride lying at the bottom, and the saucers are examined to see that no silver chloride has fallen into them. If any particles are found in the saucer they are carefully transferred to the corresponding pot.

The pots are now taken in trays to a table, where an assistant decants off the water with the aid of a glass rod, tapping them to make the contents lie evenly. A sprinkler with distilled water is used to make any floating specks of chloride sink down. The pots are completely drained, care being taken that no chloride is carried over, and are now ready for the next operation of drying.

Drying is carried out in hot air chambers, heated by gas, which have a capacity of 100 pots each, and the heat is kept below 212° F. (100° C.) till the cake of silver chloride shrinks away from the sides of the pot and can be readily loosened by giving the latter a gentle tap. This stage occupies about ¼ hour and the heating at this temperature is carried on for ¼ hour after the cake has contracted and been loosened in the cup. If the preliminary drying were carried out at a higher temperature there would

be danger of the chloride spitting and the assay being spoiled.

This procedure has been modified of late years in order to save time. The temperature of the drying chambers is allowed to rise to about 250 degs. F., since opening the doors to insert the pots lowers it to about the right level. After closing up the doors the temperature is kept just below 212 degs. F., till all moisture has gone off, which is tested by placing a watch glass over one of the pots and observing if any moisture is condensed on it.

The heat of the drying chamber is afterwards raised to 350 degs. F., or 180 degs. C., and kept at this temperature for ¼ hour. The whole process of drying occupies 1½ to 2 hours. The pots are now taken out of the drying chamber, placed on trays and allowed to cool. The chlorides should invariably be weighed immediately they have cooled down, or there is danger of some absorption of moisture in damp weather.

It is customary to weigh out 20 pots at a time, but in wet weather the author weighs out 10 at a time, and they are brought into the balance room while still warm.

The chlorides are weighed by taking out the hardened cake with a pair of platinum-tipped forceps and placing it in the pan of the balance, which is removed for that purpose to the ledge in front of the balance case.

If any particles of chloride are seen to adhere to the pot after the cake has been taken out, they are detached with a quill and transferred to the balance pan by inverting the pot over it and giving it a tap with the forceps.

The sets of weights used, to which reference was made in the early part of this paper, consist of the following pieces:

Weights from 1,000 (equal 25 grs.) to 856 at intervals of 4, these being the weights commonly used.

From 800 to 100, at intervals of 10; from 50 to 10, at intervals of 10, and from 5 to 1, serially.

In the author's opinion, a more convenient and economical arrangement of weights would be as follows:

From 1,000 to 800, at intervals of 10; from 800 to 100, at intervals of 10; from 50 to 10, at intervals of 10, and from 5 to 1, serially.

A rider worth 10 for intermediate weighings.

An assay pound 18.821 grs. and a weight 916 for check purposes.

It is the custom here to weigh the chloride cake in the right pan, the weights being placed in the left. Weighings are made directly to one part per mille, decimals up to 0.5 being estimated by the swing of the balance. The author has found it convenient to use a rider weighing 0.25 grs., corresponding to 10 points of fineness, and in this case it is more convenient to place the weights in the right pan and the rider on the right-hand side of the beam, weighing the chloride in the left pan.

In weighing out chlorides from standard meltings, or coins, by this method, the 916 weight is placed in the right pan and the rider on the fourth division of the scale, making 916. The 916 weight

is placed in the left pan and, if the pointer goes to zero when the weights are thus adjusted, the balance is in equilibrium and the weighings are commenced. In this manner the weighing out is done by substitution, and small differences of weight, less than 0.5 per mille, are estimated by the swing of the balance, as in the ordinary method of weighing.

There is a rapid method of carrying out the assay, using hot water instead of cold, which causes the chloride to settle quicker. This modification is not to be recommended when performed in conjunction with several checks and, even then, corrections are uncertain and results are apt to be irregular. Silver chloride being more soluble in hot water than in cold, results are usually low when this method is used.

The manner in which siphoning is done has considerable effect on the assay results, and it is important that all the assays should be treated alike in this respect.

To test the general accuracy of the working, but not for the purpose of making corrections of results, it is usual to have one or two checks, both of pure and standard silver, run through at the same time as the assays.

The following table of results obtained by the author in practice will show how far this method of assay can be depended on to give correct and concordant results. It is usual to reject any assay where there is a difference of more than 0.4 per mille between duplicate samples. A retrial of the number is then called for.

Sample A.—Office pure silver for check purposes.

No. of assays.	
1	1000.0
2	999.9
3	1000.1
4	1000.0
5	999.9
6	999.9
7	999.8
8	999.8
9	1000.0
10	1000.0
Mean of 10 assays.	999.94
Greatest difference from mean	0.16 per 1000

Sample B.—Commercial fine silver (granulated).

No. of assays.	
1	986.2
2	986.7
3	986.1
4	986.2
5	986.4
6	986.1
7	986.1
8	986.2
9	986.0
10	986.1

Mean of 10 assays.	986.11
Greatest difference from mean	0.11 per 1000

Sample C.—Standard silver (granulated).

No. of assays.	
1	916.4
2	916.7
3	916.7
4	916.6
5	916.6
6	916.5
7	916.5
8	916.5
9	916.5
10	916.5

Mean of 10 assays.	916.6
Greatest difference from mean	0.2 per 1000

When this method of assay is carefully worked, results obtained by taking the

mean of two assays of any sample may be relied on to 0.1 per mille, which is sufficiently accurate, and in this respect compares favorably with the volumetric methods.

It has the disadvantage of taking a longer time to perform, and the labor expended in obtaining results is, of course, much greater.

The following metals interfere with or affect the accuracy of this method of assay; their presence is always detected in the earlier operations:

(a) Gold and metals of the platinum group. Gold when only occurring in traces is weighed as chloride of silver, the quantity being usually so small that its effect is practically negligible.

Rupers dated 1845 and 1840 sometimes contain as much as 0.5 per mille of gold, and formerly, when Indian and Chinese commercial silver was brought to the mint for coinage, it was often found to contain very appreciable quantities of gold. Of late years silver bullion used for coinage purposes has been practically free from gold.

If necessary, the solution can be filtered before precipitating with hydrochloric acid, but this lengthens the process considerably, and it is difficult thoroughly to eliminate the silver nitrate by washing. For alloys containing considerable proportions of gold, the author considers assay by cupellation with checks and parting with nitric acid, or the Volland system, more satisfactory than the Indian mint method.

Platinum metals, of course, interfere in the same manner as gold, but their presence in ordinary routine work is very rare.

(b) Tin and antimony. These show their presence on solution of the assay in nitric acid, and if present in more than traces must be filtered off. Their occurrence is rare in ordinary mint bullion, but they constantly enter into the composition of counterfeit coins which are submitted to the assay office for analysis.

(c) Bismuth and lead. Bismuth forms an oxychloride on the addition of hydrochloric acid and water. This breaks up the silver chloride on agitation, and prevents the solution from clearing. A very small proportion of bismuth can be detected by the cloudiness of the solution after the silver chloride has subsided. The bismuth can be kept in solution and the formation of the oxychloride prevented by using a larger quantity of nitric acid, or about 10 c. c. for solution of the metal, and then adding only 2.5 c. c. of hydrochloric acid, which is sufficient to just precipitate all the silver, but no bismuth oxychloride will form and the assay can be proceeded with as usual.

Lead does not interfere in the proportion in which it is found in silver bullion. Even when it occurs in comparatively large amounts, it can be kept in solution by using warm water when diluting after precipitation of the silver.

(d) Mercury, like bismuth, shows itself on the addition of hydrochloric acid, and

it also interferes with the clearing of the solution.

To prove whether bismuth or mercury is causing the interference, the bottle containing the precipitated silver chloride is exposed to sunlight for a short time. If mercury is present, the chloride will not be discolored, but will remain dead white; bismuth does not prevent the darkening of silver chloride on exposure to light.

When mercury is present it is better to melt up the alloy and expose it for some time to a high temperature before making the assay. By weighing before and after, an estimate of the quantity of volatile metal can be made. This is another case in which the cupellation assay is more satisfactory than the Indian mint method.

In the Indian mints the usual methods of reduction of silver chloride by iron or zinc are not employed. The method adopted here is to fuse up the powdered chlorides with 70% of chalk and 4% powdered charcoal in a plumbago crucible. Three hundred tola (112½ ozs.) of chloride are thoroughly mixed with the correct proportion of chalk and charcoal charged into the pot and covered with a layer of common salt.

The fusion is carried on slowly, taking about two hours for the first charge and 1½ hours for subsequent charges. As each fusion is completed the contents of the pot are poured into an iron ingot mold. The slag is detached from the bar of fine silver, and slags and pot scrapings are pounded up to recover particles of silver enclosed therein.

The loss by this method of reduction should not exceed 0.2% of the calculated yield of metallic silver.

The method of assaying silver bullion described in this paper has been in operation for over 50 years and has given satisfactory results. It is suited to the conditions of the country, where labor is cheap and where men are easily procured with sufficient manual dexterity to carry out a process which mainly depends for its success on careful attention to small details of manipulation. It entails less strain on the assayer than the volumetric methods employed in Europe.

There is another advantage it possesses in the fact that slight traces of impurities, such as chlorine in the distilled water or nitric acid, have no effect on the accuracy of the method. It is sometimes difficult to procure absolutely pure acids, and distilled water in a country like India may become contaminated. This would hopelessly vitiate the ordinary volumetric results, but has practically no effect on the gravimetric estimation. In fact, the method could be quite successfully worked with ordinary filtered water, provided it was soft and fairly free from chlorides.

It has another advantage over the Gay-Lussac method. There is no necessity to have any previous knowledge of the fineness of the bullion operated on. Sometimes large numbers of assays are made of silver of unknown fineness, especially when the mint is working up its residues, or when silver from various unknown sources has to be reported on. The fact

+1 tola = 180 grs. (the weight of 1 rupee).

that different weights have to be taken for assay pieces, according to the fineness of the bullion, is another disadvantage in the Gay-Lussac method. This would complicate matters where one has to deal with native weighmen.

The volumetric assay also necessitates standing for hours together, not a desideratum in a climate like that obtaining in Calcutta, where the temperature of the assay office is between 85 degs. and 95 degs. for many weeks together.

We have found the Gay-Lussac method very useful occasionally for check purposes, and where a result is wanted in a hurry.

As it is probable that the metric system of weights will shortly be adopted for all assay work, the author is making experiments, using a weight of 0.7298 grm. as the assay pound, in which case 1 grm. will correspond to 1,000. If this weight is found to be too small to give reliable results, it might be doubled, the assay pound in that case being 1.5656 grms, and a weight of 2 grms. of chloride would correspond to 1,000 fine. The latter would be rather larger than the weights at present employed, but the difference would be immaterial and sets of weights on this basis could be easily procured.

Their checking and verification would be an easy matter, as they would all be related in a simple ratio to the gram weight. A carefully verified set of gram weights is kept in the assay offices.

### British Foreign Copper Trade.

The first six months of this year have shown a substantial change in the foreign copper trade of Great Britain. Imports were equivalent to 85,445 long tons of fine copper, consisting of 55,891 tons of metal, 40,432 tons of regulus and precipitate, and 59,590 tons of ore. Last year the total of imports in fine copper were 58,359 tons, which were made up of 33,307 tons of metal, 34,020 tons of regulus and precipitate, and 53,545 tons of ore. In arriving at the total imports of fine copper we have estimated the metallic content of the ore, regulus and precipitate.

The United States supplied most of the copper received by Great Britain this year, although Australia, Spain, Chile and a few other countries also contributed to the total imports.

The exports of copper for the half year amounted to 31,619 long tons, as against 10,260 tons in 1907.

**Frozen Gravel of Alaska.**—The frozen gravels are tough, in distinction from the muck. They cannot be broken with the pick and are with difficulty rent by explosives. A sudden caving in of the ground undermined in drifting is rare, the sinking usually being so gradual as to permit the removal of mining apparatus. In such cases a parting often takes place between the gravels and the overlying muck, leaving the latter as a roof. The solidly frozen gravels are practically impermeable to the surface waters and to any underground water that may be present and the underground mining operations are comparatively dry.

Note.—At the end of each month the quantity of gold in the minted coin is carefully estimated by dissolving in nitric acid, the acid being collected on a filter, cupelled and weighed.

## Pipe Lines for Natural Gas.

BY ULRICH PETERS.

Good economy demands that any new piping for conducting a certain maximum quantity of natural gas from the producing well to the place of distribution be carefully proportioned and calculated.

Within certain limits the flow of gas in pipe lines is somewhat different in respect to the law of flowing steam, where the condensation is a great factor. In pipe lines several miles long, a quite considerable drop in the gas pressure will be noticed, when the ground into which the gas pipe is laid becomes rapidly colder due to a change in weather. The pressure, however, will reach its normal point again under the continuation of the cold temperature, and *vice versa*, will increase in the milder periods and fall back again to its normal flow pressure when the atmosphere maintains its temperature. These changes will be particularly noticeable in pipe lines barely covered by the ground.

The average quantity of natural gas which can be conducted through a pipe line is for these reasons, quite independent of the temperature so far as it concerns the slight annual variations of the earth below the frost line. Therefore, only the gas pressure, the inside diameter and length of pipe are the principal fac-

tor quantity of  $Q$  cubic feet per hour at the open flow pressure of  $P=15$  lbs. absolute. What is the size of pipe comparing with the computed value?

$$a = \frac{Q}{42} \sqrt{\frac{L}{P_1^2 - P_2^2}}$$

Supposing that in this example  $P=315$  lbs.,  $L=30$  miles, and  $Q=190,000$  cu. ft. of gas per hour.

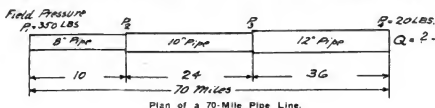
Numerically then

$$a = \frac{190000}{42} \sqrt{\frac{30}{90225 - 225}} = 78.8$$

Which value, according to above table, corresponds to the nearest pipe diameter of 5 1/2 ins., usually known as 5 1/2-in. casing.

Practically, the considerable loss in leakages at the higher pressures, and the cost of piping is greatly reduced when long pipe lines are telescopically arranged—that is, a smaller diameter is started at the producing well where the pressure is considerably higher, and then stepwise increased as the flowing gas expands in approaching the distributing center. A further illustration is given below.

Example: A 70-mile pipe line is divided into three sections, as indicated in the accompanying diagram. The field pressure  $P$  is 350 lbs. absolute, and the delivery pressure  $P_1=20$  lbs. absolute.



tors determining the quantity of gas that can be delivered through a pipe line deeply laid in the ground.

F. H. Oliphant gives the practical formula:

$$Q = 42a \sqrt{\frac{P_1^2 - P_2^2}{L}}$$

for the flow of natural gas in pipe lines, in which

$Q$ =cubic feet of gas per hour.

$a$ =constant.

$a$ =computed value for diameters.

$P_1$ =gauge pressure + 15 lbs. at intake.

$P_2$ =gauge pressure + 15 lbs. at discharge.

$L$ =length of line in miles.

Table of corresponding nominal pipe diameters for the value  $a = 1/4$  in. = .0317:  
 1/2 in. = .1810; 3/4 in. = .5012; 1 in. = 1.0; 1 1/4 in. = 2.93; 2 in. = 5.92; 2 1/2 in. = 10.37; 3 in. = 16.50; 4 in. = 31.10; 5 in. = 60.00; 5 1/2 in. = 81.00; 6 in. = 95.00; 8 in. = 190.0; 10 in. = 350.0; 12 in. = 550.0; 16 in. = 1,100.0; 18 in. = 1,570.0. For inside diameter is  $a = 1/4$  in. = .0317:  
 1/2 in. = .0317; 3/4 in. = .0317; 1 in. = .0317; 1 1/4 in. = .0317; 2 in. = .0317; 2 1/2 in. = .0317; 3 in. = .0317; 4 in. = .0317; 5 in. = .0317; 6 in. = .0317; 8 in. = .0317; 10 in. = .0317; 12 in. = .0317; 16 in. = .0317; 18 in. = .0317; 20 in. = .0317; 24 in. = .0317; 30 in. = .0317; 36 in. = .0317; 42 in. = .0317.

The problem which practice usually deals with is as below:

A producing well containing a field pressure of  $P$  pounds per square inch absolute, should supply a distributing center at a distance of  $L$  miles with the

What is the gas conducting capacity of this line per hour?

Denoting the pressures with  $P_1$  and  $P_2$  and the single lengths of sections with  $L_1$ ,  $L_2$  and  $L_3$ , we have then from the above general formula the relations:

$$P_2^2 = P_1^2 - \left(\frac{Q}{42a_1}\right)^2 L_1$$

$$P_3^2 = P_2^2 - \left(\frac{Q}{42a_2}\right)^2 L_2 \rightarrow P_1^2 - \left(\frac{Q}{42a_1}\right)^2 L_1 - \left(\frac{Q}{42a_2}\right)^2 L_2$$

$$P_3^2 = P_1^2 - \left(\frac{Q}{42}\right)^2 \left(\frac{L_1}{a_1^2} + \frac{L_2}{a_2^2} + \frac{L_3}{a_3^2}\right)$$

Resulting in the formula

$$Q = 42 \sqrt{\frac{P_1^2 - P_3^2}{\frac{L_1}{a_1^2} + \frac{L_2}{a_2^2} + \frac{L_3}{a_3^2}}}$$

Inserting the numerical values given in the diagram and table, the answer is:

$$Q = 42 \sqrt{\frac{122500 - 400}{\frac{10}{39204} + \frac{24}{122500} + \frac{36}{309136}}} = 616,140 \text{ cu. ft. per hour.}$$

The gold production of Western Australia for the first half this year amounts to 827,019 fine ozs., valued at \$17,064,483. Compared with the corresponding period in 1907, there is shown a decrease of 11,236 ozs., or \$252,248.

## American Tools in Italy.

BY GODFREY L. CARMEN.\*

The foremost machinery works in Italy are those of Franco Tosi, at Legnano. The engineering skill is of the first order, and the exports of the firm extend over Europe and across seas, especially to South America and Egypt. About 2,000 men are on the pay rolls.

I found the following American machine tools in service: Gisholt Machine Tool Co., Madison, Wis. (lathes and boring mill); Brown & Starpe, Providence, R. I. (millers and grinders); Henley-Norton Co., Torrington, Conn. (shapers); Lodge & Shipley, Cincinnati, O. (engine lathe); William Sellars & Co., Philadelphia, Pa. (planer); Cleveland Automatic Tool Co., Cleveland, O. (turret lathe); Niles-Bement-Pond, New York (lathe and planer); Becker-Brandt Co., Hyde Park, Mass. (millers); Baugh Machine Tool Co., Springfield, Mass. (vertical drills); Jones & Lamson, Springfield, Vt. (turret lathes).

I was given to understand that it is the policy of this firm to gradually replace all old tools with modern equipment, and a firm that is as go-ahead as this one will quickly recognize the advantages of a fine tool when attention is called to it. It is not necessary for an American firm to send a foreigner to this establishment.

English is spoken at the Tosi shops; in fact, English is spoken at the majority of the principal machinery houses in northern Italy.

A few of the more expert men receive as high as 11 francs (\$2.12) per day, and the pay of a shop foreman is but little more. This is considered good pay in Italy. For the majority of the men the pay ranges from 8 to 10 francs (\$1.54 to \$1.93) per day, with about 6 francs (\$1.16) for the younger and less experienced employees.

## Foreign Tin Trade of Great Britain.

From January to June, inclusive, there were imported into Great Britain 22,915 long tons of tin, which compares with 21,348 tons for the same period in 1907. Of this year's imports the Federated Malay states supplied 19,434 tons against 17,094 tons in 1907; Australia, 2,520 tons against 2,065 tons, while the remainder came from various other countries. There were re-exported this year, principally to the United States, 10,736 tons, as against 14,375 tons in 1907.

The exports of domestic tin for the first six months this year amounted to 4,288 tons, against 4,561 tons in 1907. The United States received 470 tons of this year's exports, as against 1,125 tons in 1907, the remainder going largely to France, Russia and other European countries.

Tin ores and concentrates have been imported in larger quantity this year, the total for the six months being 13,087 long tons, as against 11,154 tons in 1907. Of this year's imports Bolivia furnished 19,675 tons as against 8,571 tons in 1907.

\*U. S. special agent at Segnano, Italy.

# Gold: Its History and Economic Development.-II.

By EVANS W. BUSKETT,

*Metallurgical Engineer.*

*Progress shown in the metallurgy of gold. Washing pans, and how to handle them. Development of the rocker, "long tom," sluice, hydraulic giant, dredge, and stamp mill.*

*Operation of the amalgamation, chlorination and cyanidation processes for winning gold from ores, etc.*

In the past 50 years the metallurgy of gold has undergone a wonderful change. In Ure's Dictionary of Arts, Manufactures and Mines, published in 1847, the statement that gold occurs only in the free state is found. Telluride ores were unknown and of gold in sulphide ores very little was known. Washing and amalgamation were the only commercial processes for the extraction of gold.

There are at present five principal processes by which gold is recovered. They are: Washing, amalgamation, cyanide, chlorination, and smelting. The latter process includes lead and copper smelting of gold bearing ores.

## WASHING.

Washing may be conducted with or without amalgamation. The pan which was in use in the early days of the Georgia and California gold fields is now used only for prospecting and cleanup purposes. At first any pan available was used, but gradually two distinct forms were evolved, known as the Georgia and California pans.

The Georgia pan is a circular sheet steel pan about 12 ins. in diameter, having sides about 2 1/2 ins. high, which have an angle of about 60 degs. with the horizontal.

The California pan is from 10 to 12 ins. in diameter at the bottom and from 16 to 20 ins. in diameter at the top. It is about 3 ins. deep, the sides having a slope of about 30 degs.

In operating the pan, it is filled about two-thirds full of the dirt to be cleaned, immersed in water, and the lumps of clay broken up with the hands. The pan is then brought nearly to the surface of the water, slightly tilted and shaken sideways with a rotary motion. The light, earthy particles discharge over the lower part of the rim, leaving the gold and heavier gravel behind. The coarse gravel is removed by hand and the sands carefully washed until nothing remains but the heavy black sand and gold.

Mercury may now be added to collect the gold, and if the sand is magnetic it may be removed with a horse-shoe magnet; if not, it may be dried and blown away.

Pans are sometimes silver-plated and amalgamated. In such pans the gold is caught and held by the amalgamated silver, and scraped off with a knife or chisel.

The rocker, or cradle, is an improvement over the pan, having a much greater capacity. It probably originated in Georgia. It consists of a box about 3 ft. long, open at one end, and having two riffles across the bottom, one at the open end and the other about two-thirds of the length from the open end. It is set upon rockers, hence its name. The bottom is often covered with a blanket to catch the fine gold.

At the upper end is a removable hopper, the bottom of which consists of a 1/4-in. screen. Under this screen and sloping toward the closed end of the box is a frame on which is placed a canvas or blanket for catching the gold.

In operation, the material is thrown

into the hopper and water added by means of a hose, or by hand, while the cradle is rocked with the other hand. It is best to have a continuous stream of water so that one hand may be used to break up lumps of clay, etc.

The fine material washes through the screen onto the inclined blanket and over the riffles. Mercury is generally added behind the riffles to catch the gold.

The "long tom" requires a plentiful supply of running water. It is a rough board trough about 11 ft. long, 15 to 20 ins. wide at the upper end, about 30 ins. wide at the lower end, and 8 ins. deep. The lower end is cut off at an angle of 45 degs. and closed with a piece of 1/2-in. screen to remove coarse stones.

The tom is set at an inclination of about 1/4 in. to the foot. Below the trough and at the same inclination is a riffle box of the same width and 10 or 12 ft. long.

The gravel is shoveled into a sluice which discharges into the upper end of the tom. Here a man with a rake breaks it up and keeps the screen free from coarse rock. The riffle box takes care of itself, mercury being added to catch the gold. Often the riffle box discharges into a V box, which serves to catch any amalgam that may accidentally escape the riffles.

In working the large placer deposits of California the rocker and tom were found to be too limited in capacity for any but the richest deposits, where the gold occurred in coarse grains. It was observed that the fine gold escaped from the riffle box of the tom, and other riffle boxes were added. This led to the development of the sluice, which is a long trough, the upper part of which serves to break up the gravel while the lower catches the gold.

Sluices may be made any size from 1 ft. wide and 30 or 40 ft. long up to 6 ft. or more wide, and a mile or more long. Sluice boxes are built of rough boards, and are generally bound together with braces. Sluices are sometimes made in sections, narrower at the lower end than at the upper. They fit together and may be taken down and moved in a short time. The sections are generally made about 11 ft. long.

Sluices are lined on the sides with board, and the bottom at the upper end is lined with rough blocks or stones, which serve to break up the gravel and catch the gold. The upper sluice sometimes dis-

charges upon an inclined screen made of iron bars, the water and fine material passing through while the coarse rock is discharged from the end of the screen. This rock often contains enough gold to pay for treating it in a stamp mill. Where the boulders are very large the screen is sometimes arranged to discharge over a precipice in order to break them up.

The middle and lower sluices have cross riffles of wood, their distance apart depending on the nature of the gravel treated, inclination of the sluice, etc. Mercury is added near the upper end of the sluices to catch the gold.

In cleaning up a sluice the water is allowed to flow through until it is clear. The water is then shut off and the sand back of the riffles is taken out and any amalgam in the cracks picked out with knives. The sand is cleaned either with a pan or rocker.

Originally the gravel was excavated by hand and shoveled into the sluice, or was broken down by allowing water to fall over a bank, gradually wearing it down. Edward Mattison of Connecticut, who was working a placer mine in California, conceived the idea of directing a stream of water against the bank of gravel. At first rawhide pipes were used, with a wooden nozzle held by the operator, but as the system gradually developed, water under greater pressure was used which necessitated the use of iron pipes and a nozzle that had to be fastened down. These improvements resulted in the development of the hydraulic giant as in use today.

The hydraulic giant consists of a nozzle from 4 to 6 ft. long, mounted on a universal joint so that it may be turned in any direction. The water enters the giant through a pipe about 6 ins. in diameter. It passes through the joint into the nozzle which gradually tapers to about 2 ins. Near the end of the nozzle is another joint, operated by a lever, which permits the stream of water to be played back and forth upon the bank without moving the whole nozzle.

Water under pressure is turned in and the nozzle directed against the gravel and played back and forth until the bank falls.

A second joint is generally used to play upon the fallen gravel while the other is cutting off another slice.

There are a great many gravel deposits that could not be worked in the early days on account of the scarcity of water. Many of these are now being worked by means of bucket dredges, the water being used over again and only enough fresh water added to keep the boat afloat.

In working the dredge the machine is set up in a hole just large enough to contain the boat. The hole is then filled with water and the dredge started. The buckets are directed against the bank and pick up the gravel and discharge it upon screens. The coarse rock is discharged at the back of the boat while the sands pass through the screens and over a series of amalgamated plates and riffles which catch the gold. The sands are

then discharged at the back of the boat. In this manner the dredge works its way back and forth through the gravel beds using only the amount of water necessary to keep it afloat.

#### AMALGAMATION.

The working out of the placer deposits of California and the discovery of gold in quartz led to the development of the process of amalgamation by stamp milling.

A stamp mill consists of a steel mortar mounted on a solid foundation. There is an opening in the rear through which the ore and water enter. The front is open, being covered by a sheet steel screen through which the crushed ore discharges. The bottom is lined with cast iron dies about 8 ins. in diameter.

The stamp consists of an iron rod or "stem" about 10 ft. long and 3 ins. in diameter, tapered at the ends. The lower end fits into a head or "boss" 8 ins. in diameter and from 12 to 20 ins. long. Into the bottom of the boss a chilled iron shoe, which does the grinding, is fitted.

The stamps are raised by a series of double cams mounted on a horizontal shaft. These cams engage with a tappet near the upper end of the stem and by this means the stamps are raised and dropped on the ore, breaking and grinding it until it is fine enough to pass through the screen, which is generally 30 to 40 mesh.

Stamps are generally built in batteries of 10, there being two mortars to the battery, each containing five stamps.

The ore is first crushed to about 1½ in. mesh in a rock breaker, which discharges into a bin. From the bin the ore is fed to the stamps by an automatic feeder operated by the fall of one of the stamps, generally the central one. A constant stream of water is fed at the back, and mercury added from time to time by the millman according to his judgment and experience.

The ore, crushed between the die and the shoe by the fall of the stamp, is washed through the screen over a series of amalgamated, silver-plated copper plates, which catch the amalgam.

The plates should carry sufficient mercury to be soft enough to catch the gold, but should not run. The plates are dressed every three or four hours. While the plates are being dressed the stamps are hung up and the plates washed off with a hose. The mercury is rubbed to the top of the plates by means of a block of rubber.

The plates are then washed with a solution of lye or cyanide, applied with a whisk broom, in order to remove grease. Every 24 hours the amalgam is removed from the plates by means of a rubber, or, if hard, with a chisel. Amalgamated plates are sometimes placed inside the mortar at the back ends and front.

Every 30 days a cleanup is made. The feeding is stopped and the stamps run until the shoe begins to pound the die. The front screen is removed and the inside plates are taken out and scraped. All of the ore around the dies is scraped out and placed in a tub. The dies are then removed and the remainder of the sand

taken out and the inside of the mortar washed clean, the washings being added to the material in the tub. The dies are washed off in the tub.

The cleanup in the tub is now panned and the amalgam placed in a large mortar with that previously collected. The whole is then ground with mercury until a thin amalgam is produced. All dirt is now washed off and particles of iron removed by means of a magnet. The amalgam is poured into a chamois skin. The skin is grasped, above the amalgam, with the left hand and twisted with the right. The mercury will squeeze through the chamois skin, leaving a ball of hard amalgam on the inside. The mercury is caught in a porcelain dish and used over again.

The mercury is separated from the gold in the amalgam by retorting. This method is also used in cleanups from hydraulic mining. The retort is a cast iron vessel with a tight lid through which a pipe carries the mercury vapors into a condenser cooled by water. Before charging the retort it is thoroughly chalked inside to prevent the gold sticking in case the heat should be great enough to melt it. The amalgam is then put in and the lid luted on with clay. The retort is gradually brought to a red heat and kept at that temperature until mercury no longer distills over into the receptacle. The retort is then allowed to cool and the gold removed and melted in a plumbago crucible with soda and borax, and cast into a bar.

#### CHLORINATION.

The chlorination process was invented by C. F. Plattner of the Royal Freiberg Smelting Works, who applied chlorine gas in assaying certain residues, and proposed a similar process for the extraction of gold from its ores. This led to the vat chlorination, which has since been improved upon in the barrel process.

In treating ores by either the vat or barrel process it is necessary to crush the ore very fine, generally to about 30 mesh. If the ore is a sulphide, or contains arsenic or antimony, it is roasted in order to eliminate these objectionable elements, and leave only gold in the ore. With some ores salt is added in roasting so that copper, silver, etc., will be chloridized and not absorb chlorine. The silver is leached out either before or after chlorination by means of a hyposulphite of soda solution.

The vats in use in chlorinating are made of pine and are about 7 ft. in diameter and about 3 ft. high. They are covered on the inside with pitch to prevent the wood absorbing the gold solution. The bottom is covered with a filter of gravel ranging in size from about ¼ in. on the bottom down to a 30-mesh sand on top, and is about 12 ins. thick. The filter rests on a false bottom made of wood or sheet lead and perforated with holes ¼ in. in diameter, and supported on slats, leaving a space about 1 in. deep for the accumulation of solution. The filter bed is covered with a grid of boards so that the tailings may be shoveled off without disturbing the filter.

The vat is filled with ore, which is dampened as it is put in. The vat is filled

within 6 ins. of the top, and the ore made higher at the sides than in the center. The board cover is then placed on the vat and the joint luted with clay, to prevent the escape of chlorine. There is a small hole in the cover through which the air escapes and through which water is added.

The chlorine gas is generated in an air tight lead vessel fitted with a stirrer, which is worked from the outside. The generator is charged with 20 lbs. of salt, 15 lbs. of 70% manganese dioxide, and 3½ lbs. of 66 deg. sulphuric acid. The solids are put in and the generator covered; the acid is then added through a siphon about 2 quarts at a time, as needed. The generator is placed on a water bath and kept at a temperature of 100 deg. C.

The chlorine flows through a wash bottle into the space in the vat between the bottom and false bottom and rises through the charge, expelling the air through the hole in the cover. When all of the air is expelled the hole is closed and the gas remains in contact with the ore from 24 to 48 hours.

Water is then added until the ore is covered, and the stopcock below the filter opened. As the water drains off more is added, keeping the ore always submerged. The water is discharged through a filter of canvas from which it runs into the precipitating tank.

When the wash water shows no reaction with stannous chloride, all of the gold is extracted. The tailings are then shoveled out of the tank, and a new charge shoveled in.

Ferrous sulphate is generally used as a precipitant for the gold, the solution of ferrous sulphate being placed in the precipitating tank before the gold solution is run in. The precipitated gold is allowed to settle for 24 to 48 hours, when the supernatant liquid is drawn off by means of a floating siphon.

Every 30 days there is a clean-up. The water is drawn off and the slimes taken out and filtered. The gold is then dried and fused in plumbago crucibles, silica, lora, soda and nitre, and the gold cast into bars.

In the barrel process a lead lined barrel mounted on trunnions at the ends and having a manhole in the middle, is used. In charging, the manhole is brought to the upper side and the requisite amount of water run in. The sulphuric acid is then added. The ore chute is then opened and a weighed charge of perfectly dry ore allowed to run into the barrel. The required amount of bleaching powder is added on top of the ore, and the manhole closed and securely fastened. The barrel is then revolved for about two hours. The action of the sulphuric acid on the bleaching powder liberates chlorine, which attacks the gold.

When the chlorination is complete, water is run in and the barrel revolved. The water is then poured off by turning the barrel. The charge is washed several times; by decantation in this manner the wash water being discharged onto a filter. The charge is then allowed to run out onto the filter and the barrel washed out, the wash water being allowed to run through the filter. The gold may be pre-

capitated in the same manner as in the vat process.

CYANIDING.

It has long been known that cyanides will dissolve gold, but it was generally believed that a current of electricity was necessary. Several patents were granted for processes of extracting gold from its ores by solution in cyanides, but it was not until 1887 when the MacArthur-Forrest process was evolved that any marked progress was made. This process has been improved and modified, but is still the basis of all cyanide processes.

Before an ore is treated by the cyanide process, it should be put through an exhaustive series of tests to determine the adaptability of the process to the ore. The ore should be tested to determine percolation, extraction, consumption of cyanide, strength of solution required, time required for leaching, and precipitation. With the data from a number of such tests the metallurgist is in a position to tackle the proposition intelligently.

The degree of fineness to which the ore should be crushed depends in a great measure on the porosity of the ore. A very porous ore will not have to be crushed as fine as a hard compact ore. The ore is crushed in breakers and rolls, with frequent screenings to prevent the production of slimes.

The vats in which the ore is leached are similar in construction to those used in the vat process of chlorination, and have the same kind of filter and false bottom. They are, however, much larger, and vary in capacity from a few tons to 600 tons to the vat. They are made of wood, iron, and cement. Their depth should not exceed 7 ft.

The ore is dumped into the vats from cars which run on tracks across the tops of the vats. When a vat is full the ore is leveled with a hoe, the man handling the hoe standing on the track or on the edge of the vat so as not to settle the ore.

In leaching, it is sometimes necessary to counteract certain chemicals present in the ore which may cause an excessive consumption of cyanide. These are eliminated by first washing with water, potassium hydrate, lime, or other suitable wash. When chemical washes are used, the wash is run off and washed water added above to remove the chemical.

A solution of potassium cyanide of suitable strength is then run in until the ore is covered, the cyanide solution remaining in contact with the ore for 12 to 60 hours when it is drawn off through the filter bed. The charged is washed, first with a weak cyanide solution and finally with water, the solution being discharged through the precipitating boxes.

The tailings are generally removed by sluicing through a large hole in the bottom of the vat, a hose being used for the purpose.

The gold is precipitated by passing the solution through a series of boxes containing zinc shavings. The solution generally passes from the bottom to the top of the zinc box. The shavings are supported on screens near the tops of the boxes. As the gold is precipitated, the zinc breaks up and falls through the

screens and settles at the bottom of the boxes, leaving a fresh surface of zinc on the screens. Zinc dust is also used in precipitating gold in the cyanide process.

The zinc may be dissolved in dilute sulphuric acid, and the residue melted in a graphite crucible with silica borax, soda and niter, and the gold cast into bars. The zinc slime is sometimes roasted in an iron pan, the zinc being burned off; it is then melted in a crucible with the proper fluxes.

Gold is also extracted in the smelting of lead and copper ores. The process of extracting gold from lead bullion was described in an article on lead which appeared in THE MINING WORLD March 21 last.

Diamond Drill Costs.

BY C. J. MCCORD.

The writer has read with interest the article on the Cost of Diamond Drilling in Boundary District, by Frederic Keffer, which appeared in The Mining World for July 25 last.

Tables and figures showing progress and relative cost of diamond drill explorations, similar to the ones compiled in the article mentioned above, appear from time to time in various mining periodicals, as a rule about mining companies that are doing their own drilling. The writer is associated with a firm which conducts diamond drill explorations almost exclusively and to whom the matter of the costs for such work is not only of the greatest interest but of prime importance as well.

Mr. Keffer in his general summary of costs includes labor, power, repairs, oil, etc., and carbon. From these items he figures a total cost and a corresponding cost per foot for the month and year. It seems to me that the cost thus arrived at is slightly erroneous, so far as taking it as a basis for general explorations in any territory is concerned, or, perhaps, I should say the method of arriving at the cost. The items as they stand are not sufficient.

There are two important items which seemingly have been neglected—depreciation on the machinery and equipment and the interest on the investment—items that will materially affect final costs and from a practical cost account standpoint may not be disregarded.

In taking depreciation into account, each outfit should be given an estimated value and a stated percentage of depreciation applied and made a monthly charge. In the same way a fair rate of interest should be computed against the investment represented and charged accordingly. These percentages may be determined by the individual according to his own ideas of what constitutes a fair rate.

There are also a number of charges continually coming up of a miscellaneous sort that are not properly chargeable under the heads mentioned. These are usually entered under the head of general expense. This account may or may not assume large proportions, but it has its place in the general charge, and each outfit should bear its share. A yearly or monthly estimate, or summary of costs, that does not take these special items into account is misleading to the operator him-

self and also to any one who may be contemplating similar work.

While dealing with the subject it might not be out of place to make a few suggestions regarding carbon cost. This is one item that is rather unique and presents possibilities for diverse opinion. Carbon has its own particular methods of depreciation. It is well known that new carbon will lose heavily in shaping and a percentage will break with great and perhaps entire loss. Old, rounded carbon put on a contract may hold up with little loss from actual wear in the bit. Accidents may befall any and all carbon, and must be taken and accounted for as they come.

On the other hand, an exploration may be begun with the best of rounded and proved stones in the bits, but at the end of the work a large proportion of these stones are, by accident or wear, reduced to a size that renders their further service uncertain. The loss may have been charged off according to the market price at the time of purchase, but their inventory value has been greatly reduced; in fact, many may prove almost worthless. This is an item of interest to the drill-man who is unking up his cost sheet.

I have tried to present these suggestions from the point of view of the operator or mine owner, and not from that of the contractor, the operator who wishes to know what his work is costing him on the basis of a fair valuation.

There are numerous conditions emerging into the contractor's cost statement that are outside of the ones briefly noted above. Among these are freight shipments with the added expense of office superintendence from a distance. Where drills are isolated there is the increased labor, cost of fuel transportation, maintaining camp, pumping stations for drills, etc. However, these points are not relative to the exceptions taken.

**Sicilian Sulphur Prices.**—Current quotations for sulphur per long ton, f.o.b. Sicilian ports, are reported by Emil Fog & Sons as follows: Best unoxidized seconds, in bulk, exclusively for export to San Francisco, 61s 9d (\$15.00); for Australia, 69s 8d (\$16.95), and other ports, 81s (\$19.08); best thirds, in bulk, 78s 3d (\$19.01); current thirds, in bulk, 74s 9d (\$18.16); refined block sulphur, in bulk, 86s 9d (\$21.08); refined block sulphur, in bags, 90s (\$21.87); best seconds, ground, in bags, 87s 9d (\$21.32); sublimed flowers, pure, in bags, 108s 3d (\$26.30); sublimed flowers, current, in bags, 100s (\$24.30); sublimed flowers, commercial, 92s (\$22.36); roll sulphur, in bags, 93s 3d (\$22.66); roll sulphur, in casks of 3 cwt. (336 lbs.) and cases of 50 kgs. (110 lbs.), 96s 9d (\$23.51); roll sulphur in sticks, 100s 9d to 102s 9d (\$24.48 to \$24.97).

**Gold Mining in Ashanti.**—The production of gold in Ashanti, West Africa, during 1907, is officially reported as 77,658 fine ozs., valued at \$1,065,191, showing a substantial increase over 1906. Of this total output for 1907, the dredging companies reported 9,799 ozs., valued at \$202,545.



## Coal Mining in West Virginia.

BY E. W. PARKER.\*

The total production of coal in West Virginia in 1907 was 18,091,583 short tons, having a spot value of \$47,846,630.

In 1906 West Virginia displaced Illinois for second place among the coal-producing states, but her triumph over Illinois was of short duration. As a result of the suspension in 1906, ranging from two months to 10 weeks at most of the Illinois mines, pending an adjustment of the wage scale, the coal production of Illinois was materially restricted, whereas in West Virginia, where most of the miners are unorganized, operations were carried on practically without interruption, and that state outranked Illinois with a lead of 1,810,246 tons. The record for 1907, however, showed that the production of Illinois made a phenomenal increase of 9,857,042 tons, more than double West Virginia's increase of 4,801,233 tons, and West Virginia again dropped to third place. Compared with that of 1906, West Virginia's coal production in 1907 showed an increase of 4,801,233 tons, or 11.05%, in quantity, and of \$8,791,691, or 18.55%, in value.

During the first nine months of the year business was exceptionally active, and the demand for coal was considerably in excess of the supply of cars to transport it, but as West Virginia is one of the producers of high-grade steaming and coking coal, the influence of the monetary disturbance of October was keenly felt. Coke making fell off quickly as soon as the panic began, and the coal production of the state during the last 10 weeks of the year was probably not more than 50% of the capacity. Had the production kept up for the entire year at the rate exhibited during the first nine months, the total production would probably have reached 53,000,000 tons.

West Virginia differs from any of the other important coal producing states in that, except for the coal which is consumed by the railroads, a comparatively small amount is used for manufacturing purposes, and that which supplies purely domestic consumption, practically all of the product is shipped outside of the state. When compared with the production of coal in the state, the manufacturing industries of West Virginia fall into insignificance. The greater part of the coal mined is sent out of the state to assist manufacturing communities elsewhere. The question may well be asked: Is it not time for West Virginia to develop a Pittsburg, a Chicago or a St. Louis within its borders?

The total number of men employed in the coal mines of West Virginia in 1907 was 50,029, who worked an average of 230 days, against 50,200 men for an average 220 days in 1906 and 48,289 men for an average of 200 days in 1905. The average production per year per man in 1907 was 815 tons, against 819.5 tons in 1906 and 581 tons in 1905. The average daily production per man was 3.54 tons, against 3.86 in 1906 and 3.74 in 1905. The productive efficiency per man employed declined in spite of the fact that

the amount mined by the use of machines increased from 15,565,113 tons in 1906 to 17,627,925 tons in 1907, and the percentage of the machine mined product increased from 36 to 36.65. In 1906 there were 1,322 machines in use and in 1907 there were 1,531—617 of the pick or puncher type, 853 chain-braided machines, and 63 long-wall machines.

On account of the terrible disaster at the Monongah mines of the Fairmont Coal Co. in December, 1907, the casualty record for the year gave West Virginia a higher death rate per 1,000 and a lower tonnage for each life lost than any other coal producing state. According to the statistics compiled by J. W. Paul, state mine inspector, the total number of men killed in the coal mines in 1907 was 729, of which 484 were killed as a result of gas or dust explosions, most of them in the disaster at Monongah. Falls of roof or coal caused 144 deaths and 104 injuries, powder explosions and windy shots caused 23 deaths and 34 injuries, and 78 deaths and 107 injuries were attributed to miscellaneous causes. The death rate per 1,000 of employees was 12.35, and the number of tons mined for each life lost was 65,969.

## A New Canadian Cement Plant.

Forty-eight miles from Calgary, Canada, surrounded by the small industrial town of Exshaw, named after one of the Western Canada Cement & Coal Co.'s active directors, are situated the great new Portland cement mills of this company. The plant, comprising 15 fireproof buildings, has an approximate floor space of 34 acres and a daily capacity in finished product of 2,000 bbls.

The plant is the largest and best equipped of its kind in the Dominion.

The cement company owns over 1,200 acres of limestone from which it is believed the present plant may be supplied for a period of 500 years at its maximum output. The limestone is high-grade, averaging over 98% of carbonate of lime, and is quarried from solid rock by means of electric drills.

The quarry cars are operated wholly by gravity, the loaded car being started for the tippie on a slight grade. On being dumped from the cars, the lime-stone goes down a steel chute into a No. 7 and a No. 4 type K Gates crusher, built by the Allis-Chalmers Co. of Milwaukee, Wis., and supplied through Allis-Chalmers-Bullock, Ltd., of Montreal.

On the way to the drivers the belt conveyor passes over the rock storage bins, which are capable of holding 10,000 tons of crushed rock, a two-weeks' supply for the mill. The belt conveyor on its return trip passes underneath these bins, and, in the event of the rock supply from the outside workings being cut off, bin gates are opened directly onto the conveyors, which elevate the material and carry it to the drier hoppers.

Having left the first system of belt conveyors, the rock is received by an automatic feeder into the driers. These driers are specially designed cylinders 80 ft. in length, set on a slight angle of 1 in. to 1 ft. At one end is a furnace, and at the other a fan. The fan draws the full

heating power of the coal through the constantly rotating cylinders thereby eliminating all moisture from the finely crushed rock.

Coming from the driers the rock is carried on a steel chute on a separate set of conveyors, elevated and transferred to a set of grinding mills for fine crushing. From these grinders the now finely powdered substance is carried by a conveyor belt to the storage tank, whence it is drawn through the bin grates and carried to the mixing bins. At this stage of the process the chemist starts his analysis on samples taken every half hour from each bin.

The next step in the process is the mixing of limestone with the shale. The Exshaw works are fortunate in having two separate and distinct qualities of clay to draw upon. Analyses are made of the clay as of the limestone, and the results form the basis for calculating the percentages of each to be used. The clay passes through much the same process as does the limestone; it is crushed several times. Two drying processes are given the clay, in order to eliminate even the smallest trace of moisture when it mixes with the lime.

After mixing the clay, the product is ready for the final mingling with the limestone. It is next carried by a conveyor belt to four mixing hoppers, two for each ingredient, so that while one set is being mixed, the other is placed in readiness. The completed mixture, consisting of approximately 25% clay to 80% rock, is then carried by the conveyor to the battery of tube mills, 16 in all, 5 by 22 ft., built by Allis-Chalmers Co. and driven by electric motors.

The cement kilns are 80 ft. long by 27 ft. diameter and bottle shaped after the design of the company's engineers. Powdered coal is used for fuel. The product of the kilns, known as cement clinker, is ground fine in another set of mills, after which the finished product is sent to its bins, which have a capacity of 140,000 bbls. Canadian Pacific railway spur tracks are placed conveniently so that 20 cars may be loaded at once from the platform.

The power house equipment for this plant is typical of the best modern practice. Three Allis-Chalmers 1,000-kw. steam turbine generator units have been installed, each to generate current of 60 cycles, 3-phase, at 600 volts. These turbines are driven by steam from Babcock & Wilcox boilers, using coal brought from the cement company's mines, which comprise 300 acres of coal lands, which contain high percentage of volatile combustible matter.

The current generated from the turbine units are devoted entirely to power purposes, the lighting load, consisting of some 400 acres and 400 incandescents are carried by the exciters, also of Allis-Chalmers build, in addition to their work of furnishing current exciting the turbo generators.

The western Canada plant represents an investment of approximately \$1,500,000. Sir Sanford Fleming, K. C. M. G., is president, and P. D. MacKinnon, general manager.

\*Extract from Mineral Resources of U. S. for 1907.

# Equipment of Calumet & Arizona Co.'s Shops.

By H. W. CHITTENDEN:

The shops for the general repair and construction work of the Calumet & Arizona and Superior & Pittsburg mines at Bisbee, Ariz., are located at the Junction shaft of the Superior & Pittsburg Co. These shops are the property of the Calumet & Arizona Co., but do the work for both companies at the same price.

There are small repair shops at the individual shafts, but the greater part of the repair work and all of construction, is done at the main shops.

The amount of construction is comparatively small, building of the mine cars being the largest piece of this class of work. Pipe work is extensive. The amount of repair work is large and varied, and, as illustrative, the machine shop work includes the overhauling and repairing of boiler pumps, sinking pumps, diamond drills, small underground hoists, etc.

The boiler shop repairs all boilers, and does other boiler maker's work, such as cages, etc. A large number of old boiler flues are cut off and new ends welded on.

In the blacksmith shop the usual heavy preliminary work is done on the iron and steel, preparing it for finishing in the machine shop, besides the regular smaller work over the fires.

In the tin shop the largest individual piece of work done is the construction of the 6 in. by 12 in. air pipe used for ventilation in the various drifts, stopes and raises all over the mines.

The shops to be described, which include the machine shop, boiler shop, blacksmith shop and tin shop, are in two buildings: one 56 ft. by 128 ft., and the other 40 ft. by 128 ft. The large building includes the machine and blacksmith shops; the former 56 ft. by 80 ft. and the latter 56 ft. by 48 ft. The smaller building includes the boiler and tin shops, re-

*By agreement repair and construction work of both the Calumet & Arizona and Superior & Pittsburg mines is done at a uniform price. Repair work is extensive.*

*Machine, boiler, blacksmith, and tin shops. Electricity used for power. All tools and apparatus of modern type.*

spectively, 40 ft. by 88 ft. and 40 ft. by 30 ft. Eventually a new blacksmith shop will be built and all of the present larger building used as a machine shop.

The buildings are constructed of fairly



Exterior of Calumet & Arizona Shops.

light steel framework covered with galvanized corrugated iron. The construction is considerably lighter than that used in the north, on account of the mild winters, and because there is no snow weight to stand up under.

## MACHINE SHOP.

This shop is typical of those of the large mining companies of the southwest,

and is well equipped with the machinery necessary for repair and construction work.

The machinery is driven by a 20-hp. electric motor; the main line shaft is through the center of the building with the various machines on either side. A crane having a 5-ton capacity, run by land power, is also in the center of the building with a width of 30 ft.

The machines with their manufacturers are as follows:

One 26 in. by 48 in. double spindle lathe with a 30 ft. bed, made by J. J. McCabe.

One 32 in. lathe with an 18 ft. bed by the American Tool Works Co., Cincinnati, Ohio.

One 20 in. lathe with a 12 ft. bed, made by the Heudey Machine Co., Torrington, Conn.

One 18 in. lathe with 10 ft. bed, made by the American Tool Works Co.

One large pipe cutting machine taking pipe from 3½ ins. to 12 ins., made by the Keeler Manufacturing Co.

One small pipe cutting machine taking pipe up to 3½ ins., made by the Sarecki Manufacturing Co., Erie, Pa.

One 4 ft. radial drill press, made by the Dreses Machine Tool Co., Cincinnati, Ohio.

One 26 in. upright drill press, made by the W. F. & John Barnes Co., Rockford, Ill.

One 42 in. open sided planer, made by the Detrick & Harvey Machine Co., Baltimore, Md.

One 26 in. heavy shaper, made by the Stockbridge Machine Co., Worcester, Mass.

One No. 3 universal milling machine, made by the Cincinnati Milling Machine Co.

One universal grinder, made by the Cincinnati Milling Machine Co.

One Yankee drill grinder, made by the



Interior of Calumet & Arizona Shops.



Pipe Machine.

Wilmuth & Morman Co., Grand Rapids, Mich.

In addition to the above machines there are in the shop an emery wheel and emery water grinder and seven, five, of which are Prentiss' vices, with swivel jaw and base.

#### BLACKSMITH SHOP.

The blacksmith shop is equipped with six forges.

One 1,100-lb. steam hammer, made by Bennett Miles & Co.

One No. 1 250-lb. steam hammer, and a crane of 3,000 lbs. capacity serving one forge and the large steam hammer.

#### BOILER SHOP.

The boiler shop machinery is driven by a 10-hp. motor. The shop is equipped with one set of 6 ft. rolls, made by Hilles & Jones Co., Wilmington, Del.

One No. 2 double pinch and shears, made by the Hilles & Jones Co.

One flue welding machine, made by Henry V. Hartz, Cleveland, Ohio, with its furnace.

One flue rattle 18 ft. by 30 ins., which is used for taking the scale off boiler tubes, made in the company's shops.

One 20 ft. 2-ton crane, one forge and one 6-in. Prentiss vice.

#### TIN SHOP.

The tin shop where all the ventilating air-pipe is made, together with the other tin work for the mines and on the surface, is equipped with hand power machinery, which includes one set of rolls, square shears and breaker, bench hand tools for crimping double seaming, etc., and a gasoline burner.

### The Commerce of Australia.

BY JOHN P. BRAY.\*

The total trade of the commonwealth of Australia in 1907 reached the record amount of \$602,249,710. The imports were \$352,465,119; exports, \$354,784,591. Compared with the previous year the imports show an increase of \$34,788,978, and the exports of \$15,405,766.

The increase in imports has been spread over nearly all the leading departments of business. Metal goods have increased considerably, the total under the six headings of galvanized iron, bars, rod, etc., pig iron, etc., tin plates, metal manufactures, and tools of trade, being \$36,088,661 in 1907, against \$28,615,569 in 1906, an increase of \$7,473,101. Machinery imports for 1907 were \$15,398,078, against \$11,225,380 in 1906.

The imports in 1907 included: Agricultural machinery, \$1,902,837; chemicals, etc., \$4,665,499; gold, \$7,128,235; iron and steel bars, rods, etc., \$5,211,992; plate and sheet (galvanized), \$6,567,824; pig and scrap iron, \$1,125,805; lumber, \$7,817,010; machinery, not agricultural, \$13,594,341; metal manufactures, \$19,611,137; kerosene oil, \$2,430,679; paints and colors, \$2,167,719; tin plates, \$1,210,683, and tools of trade, \$2,341,200.

Ceylon produced 33,739 long tons of salt last year.

\*American consul general at Melbourne.

### Uses of Bauxite.

BY W. C. PHALEN.\*

The chief uses of bauxite are (1) as raw material in the production of metallic aluminum. This is by far the most important use of the material. A large part of the entire output of Arkansas has been devoted to this purpose, and the figures of production from this state have shown remarkable growth during the past few years.

(2) In the manufacture of aluminum salts. A large part of the Georgia-Alabama product is used for this purpose, owing to its relative freedom from oxide of iron.

(3) In the manufacture of artificial abrasives (alundum).

(4) In the manufacture of bauxite brick. This last use in refractory brick is of recent date. The bricks are of chief value in resisting the corrosive action of molten metal at high temperatures, and hence are applied in basic open-hearth steel furnaces, in furnaces for refining lead, in copper reverberatory furnaces, and in the linings of rotary Portland cement kilns.

In the manufacture of the brick the bauxite is first washed to remove free silica and then calcined at a temperature of 2,500 degs. F. Very little or no shrinkage takes place below the temperature of 2,390 degs., hence 2,500 degs. is about the lowest safe temperature that may be applied.

The calcined material may be bonded with plastic fire clay, sodium silicate, or tree lime, and the bricks, after drying, are burned in down-draft kilns at high temperatures, such treatment rendering them hard and tough. A 9 by 2½ by 4½-in. brick weighing 7½ lbs. has been found to stand a crushing test of 10,000 lbs. per sq. in.

For open-hearth steel furnaces a high alumina and low silica brick is essential, and the purer the alumina used, the more satisfactory the results. The pisolites or small rounded concretions are found more satisfactory for this purpose, as they carry a higher content of alumina than the other grades of bauxite. This material is obtained by selecting, washing, and sifting the purest bauxite at the mine. The finer material containing the greater part of the silica passes through the sieve and is rejected.

Recent tests have shown that bricks containing less than 12% silica would be satisfactory, and that in open-hearth steel furnaces they withstand the corrosive action of the metal and basic slag as well as do magnesite bricks. The reason of this resistance may be due wholly or in part to the fact observed by Sir William Siemens that the bauxite, when subjected to the intense heat of the furnace, is converted into a solid mass of emery, so hard as to be scarcely affected by steel tools and able to resist mechanical, caloric and chemical action.

As a lining in rotary Portland cement kilns, bauxite bricks are giving satisfaction. They are soft enough to allow a coat of the cement to stick to them and thus protect them, lengthening their term

of use, and still not soft enough to allow any part of the bricks to be pulled away. Only a small part of the kiln need be lined with the brick; namely, the hot zone (10 to 12 ft. in a 60-ft. rotary kiln).

The most recent application of bauxite and copper reverberatory furnaces. During the process of lead refining the scum which rises to the surface is composed for the most part of basic oxides which attack the silica in ordinary fire brick linings.

The use of bauxite brick largely composed of basic oxide has reduced the tendency to reaction with consequent increased duration of life to the furnace lining. It has been estimated that bauxite bricks last five to six times as long as ordinary silicious fire bricks.

### Greek Railway Building.

BY EDWARD I. NATHAN.\*

At present the lines in southern Greece practically consist of a belt line encircling the Peloponnesus (peninsular Greece). They are operated by the Piræus, Athens & Peloponnesus Railroad Co. From Athens the line, which has a total mileage of 750 kilometers (kilometer equals 0.62 mile), runs to Corinth. At this point it divides into two branches, which by different routes both run to Calamata, an important port of southern Greece. The eastern branch runs by way of Argos and Tripolis.

There is a short spur running to Nauplia, a commercial port in the province of Argolis, and a resort for tourists visiting the ruins at Mycenæ, Tiryns, and Epidaurus. The western branch from Corinth runs to Patras, a distance of 82 miles (139 miles from Athens), and hence by way of Pyrgos to Calamata, an additional 179 miles. From Pyrgos there is a branch of 13 miles running to Olympia.

There is at present no railroad communication with Sparta. There is a carriage road 37 miles long extending from there to Tripolis, and it is proposed to parallel this with a railroad which is to extend from Tripolis by way of Sparta to Gytheion, another port of southern Greece. The opening of direct railroad communication between these points and Athens and Patras would be of great importance to trade.

Another proposed railroad extension is that of the Northwestern railway, a branch of the Piræus, Athens & Peloponnesus Co., which, beginning at Krieneri, opposite Patras, across the gulf of Patras (connecting by steamer), runs by way of Missolonghi to Agrinion, an important commercial town of the province of Acarnania-Aetolia. The extension is to run by way of Caravassera to Arta, on the Ambracian gulf, a distance of 70 to 80 km., about equal to the present length of the railroad.

There is at present a 9-mile narrow gauge railway from Diakofto, a station on the main line between Corinth and Patras, to Kalavryta, in the mountains of the Peloponnesus. From this point a railway to Tripolis has also been projected.

\*Extract from Mineral Resources of U. S. for 1907.

\*American consul at Patras, Greece.

# Notes on Asbestos Deposits of the United States.

By J. S. DILLER,\*

Geologist.

It is a matter of deep regret that the United States is unable to supply from its own mineral resources the great and increasing demand for asbestos. Prospectors aware of its value are looking for asbestos at many places.

The best asbestos is chrysotile, and its forms cross fiber veins in serpentine. The serpentine enclosing the veins may contain much shorter fiber. All serpentine areas should therefore be prospected for asbestos. The most promising masses are those associated with other old crystalline rocks which have been subjected to a succession of crushing stresses during several mountain building epochs.

Owing to the great variation in the rocks, it is difficult to give definite data for determining a workable property, but a most important feature is the abundance of cross fiber veins from which the crude fiber may be obtained. That is not essential, however, for in a number of Canadian mines no crude is produced, but the milling rock is rich in short fiber.

According to F. Cirkel, in a few mines working rich ground the quantity of Nos. 1 and 2 crude can be put down as from 1 to 2% of the total rock mined. An average of the milling rock furnished by the mines may be taken as from 30 to 60% of all rock mined, with a minimum of 20% and a maximum of 70%; and of the rock milled, from 6 to 10% is extracted as fiber. These percentages afford an approximate basis for judging of prospects, but apply only to serpentine.

Prospecting amphibole asbestos, especially of the slip fiber and cross fiber types, is not encouraging. They may be regarded perhaps as unpromising features, for the most successfully mined amphibole asbestos is the mass fiber type, where slip and cross fiber are practically absent. In the southern Appalachians intruded masses of pyroxenite, altered to mass fiber, may be much more common than now supposed. They are frequently so weathered as to afford no solid outcrop, but generally contribute asbestos fiber to the soil, and may thus be discovered.

## GEORGIA.

**Sall Mountain.**—The asbestos production of the United States has never been large, and the principal part of it for over a dozen years has come from the Sall Mountain mine, in Georgia. Operations began at this point about 1894. A mill was built, including, with numerous accessories, two Raymond pulverizers. The mill has a capacity of about 10 tons a day. Two grades of material are produced, depending upon the quality of the material furnished the mill.

The asbestos mined at Sall Mountain is mass fiber. It is of an entirely different type from the most part of that mined elsewhere in the United States or Canada. The rock is amphibolite; its whole mass is made up of groups or bundles of more or less radial, fibrous asbestos,

*Advice to prospectors in search of merchantable asbestos deposits. Output of United States obtained principally from Sall Mountain, Ga.*

*Geological characteristics of deposits in Georgia, Virginia, Vermont, Texas, Wyoming, Arizona and California. Peculiar deposit found in the Grand Canyon. Prospecting in the Philippines.*

which ranges in length from 1/4 ins. down to a small fraction of an inch.

These radial fibers tend to form spherical bunches, but with interferer crystallization these bodies are only imperfectly developed, and in most cases the radial structure is lost in an irregular accumulation of fibrous sheaves or bunches running in all directions and giving the rock an aspect of coarse granular crystallization. None of the fibrous amphibolite masses are schistose, though near the edge they sometimes pass into talc schist with definite fissile structure.

The fibrous amphibolite, composed of anthophyllite where best developed, and freshest in the Sall Mountain mines, is grayish white, and composed so largely of asbestos fiber that, according to the estimate of the superintendent, S. B. Logan, considerably over 90% of the original rock is realized as fiber.

Besides a little talc and carbonate of lime, the best rock contains numerous small grains of pyrite and magnetite, which upon alteration stain the fiber brown with iron oxide, and in the course of time the whole mass softens without losing its fibrous structure. The tensile strength of the fiber is reduced in this change, but sufficient strength still remains to make the fiber useful as a binder when mixed with other material.

The occurrence and persistence of these masses of fibrous amphibolite is a matter of prime importance, and the mines at Sall Mountain throw considerable light upon the subject. Within an area a little more than 1/4 mile square there are six separate masses, each one roughly elliptical in shape. Three of these, embracing the most important, are in line, with their longer axes approximately parallel and running N. 80 degs. E. They are all embedded in gneiss, which is well exposed at many points in the mine and in places appears to be cut by the amphibolite as an eruptive.

The largest mass of amphibolite (the original discovery) had a length of about 75 ft. and a width, near the middle, of 50 ft. It is nearly mined out at a depth of 50 ft., and unless the small remnant at the southwest corner shows connection downward, as seems improbable from the course of the walls exposed, the mass is completely cut off below by the gneiss.

The two smallest masses have been completely removed, showing a continuous exposure of the decomposed gneissoid rocks beneath. The relations of the three remaining amphibolite bodies to the gneiss have not been fully determined. The quality of the remaining bodies is inferior to that of the largest body, but they will supply the mill for some years to come.

**Cleveland and Soque.**—Near Cleveland, five miles southwest of Sall Mountain, there is a group of comparatively small undeveloped masses of fibrous amphibolite, like that of Sall Mountain. These are in a belt, trending about N. 41 degs. E. almost directly toward the Sall Mountain locality. They are surrounded by gneiss. The Sall Mountain Co. owns this property and hauls the material to the Sall Mountain mill.

Near Soque, seven miles northeast of Sall Mountain, are small areas of exposed amphibolite with short fiber. The amphibolite is here associated in the same ledge with a fresh rock that is composed chiefly of a mineral which appears to be pyroxene or olivine, with numerous acicular crystals and fibrous bundles of orthorhombic amphibolite, probably anthophyllite.

The rocks, like those of Bedford and Rocky Mount, Va., and unlike those of Sall Mountain and Cleveland, Ga., have been sheared and locally, on the planes of shearing, contain considerable slip fiber, which attracted the attention of the prospectors. The strike of the amphibolite belt, as well as the plane of shearing, is approximately N. 70 degs. W. Several other localities of the same material occur farther northeast, in Habersham and Rabun counties. One of them, the Miller property, was worked many years ago; but as far as known they are not of economic importance.

**Hollywood Mine.**—A small production of asbestos, in 1907, was reported, by the National Asbestos Co., from a mine near Hollywood, in Habersham county, Ga., where a new mill was operated for a few months and then closed. The rock is firm and comparatively fresh. The least altered portion is composed of coarse granular pyroxene and acicular fibrous amphibolite (asbestos), with much talc, chlorite, and magnetite.

## VIRGINIA.

**Bedford County.**—Virginia has been reported as a producer of asbestos for a number of years, but it did not produce any in 1907. The mines, now inactive, are located in Bedford and Franklin counties, and the mill at Bedford City for fiberizing the material is closed.

The Bedford asbestos mines are on the Hubbard farms, 12 miles south of Bedford City, and are spread over two areas, one of about two acres and the other of five acres.

The asbestos rock is of two types. One type, like that of Sall Mountain, Ga., is composed essentially of fibrous amphibole, and the other is a peridotite composed chiefly of a granular mineral which ap-

\*Extract of Mineral Resources of U. S. for 1907.

pears to be olivine, with numerous acicular crystals and fibrous bundles of anthophyllite.

In the amphibolite the fibers are arranged in groups or bundles lying in all directions—mass fiber similar to that of the Sall Mountain mines in Georgia. Only a small mass of it occurs in the Bedford region. In the northern part of the area, northeast of Mrs. Hubbard's house, a vertical dike-like mass of it 5 ft. in width, with a strike N. 80 degs. W. lies parallel to the schistosity between masses of pyroxene-hornblende schist. It seems most probable that the amphibolite, composed of mass fiber asbestos, at Bedford, Va., and Sall Mountain, Ga., is derived from pyroxenite, but the evidence favoring this view cannot be considered in this paper.

The peridotite type of asbestos rock is cut by a few small veins of cross fiber anthophyllite from  $\frac{1}{8}$  to  $\frac{1}{4}$  in. in length. The fiber is flexible and somewhat elastic, but it has numerous cross fractures, and unlike chrysotile, it is relatively short and brittle.

This rock is cut, also, by occasional planes of shearing, along which there have been developed vein-like masses of slip fiber, which lie parallel to the plane of slipping. These are the masses that attract the attention of the prospectors, and are the parts that have been mined out. They are locally 18 ins. in thickness, and have a length along the strike of about 30 ft. How far they have been followed in depth could not be learned, as the holes were filled with water at the time of the writer's visit. These masses of slip fiber are very irregular, and, as far as yet known, of so small extent as to furnish a very unreliable basis of mining operations.

**Franklin County.**—A small quantity (40 tons) of slip fiber has been mined near Rocky Mount in Franklin county. The vein, with strike S. 50 degs. E. and steep dip to the northeast, lies parallel to the schistose structure of the enclosing amphibolite. It has been mined out in a shaft nearly 40 ft. in depth. The amphibolite is much altered. Its principal constituent is acicular crystals and fibrous bunches of a colorless mineral with cleavage like amphibolite. It looks very like anthophyllite, but has inclined extinction and is probably tremolite.

All of the asbestos bearing rocks of the Rocky Mount region are practically amphibolite. Locally it contains some olivine and is much altered to chlorite and serpentine. In none of the outcrops prospected does the amphibolite contain a sufficiently large percentage of asbestos to indicate clearly the probability of profitable mining.

There are two beds of amphibolite lying between masses of mica schist, which has remarkably regular cleavage, so that it can be split into thin slabs yards in extent and has been quarried for curbing and flagging. The schistose structure is not nearly so prominent in the amphibolite as in the neighboring mica schist.

#### VERMONT.

The formations which in Canada contain valuable deposits of asbestos extend southwest into Vermont where similar masses of serpentine with considerable

asbestos are known to occur. They were thoroughly prospected some years ago, and regarded as sufficiently encouraging to warrant the erection on the southeastern slope of Mount Belvidere of a large mill for the extraction of fiber, but the attempt was unsuccessful.

Another endeavor is now in progress by the Lowell Lumber & Asbestos Co. A mill was erected in 1907 on what was formerly known as the Tucker property, which contains a type of separating machinery different from that of the Canadian mills. Although not completed in time to produce any marketable fiber in 1907, it began operations early in 1908, and when seen in operation, May 5, 1908, a carload of fiber had already been shipped for the manufacture of paper.

#### TEXAS.

At Dallas, Tex., a small percentage of asbestos mixed with other ingredients is used to make asbestos paint. The asbestos is a dull greenish amphibole, possibly actinolite, for it has inclined extinction. It is said to be obtained in Texas and appears to be used only in the manufacture of asbestos paint.

#### WYOMING.

Active prospecting continues in the Casper region, Wyo. Many claims have been taken up and consolidated under a few companies, but as yet there is no regular production nor are there any mills in the course of erection. Some of the hand-cobbed material has been fiberized and used successfully in Denver for manufacturing pipe covering.

There are two districts of asbestos bearing rocks in the Casper region—one on Casper mountain, nine miles directly south of Casper, embracing approximately an area equal to three sections, and the other half as large, on Smith creek, 30 miles southeast of Casper.

In both districts the asbestos occurs in serpentine almost wholly in the form of cross fiber veins. It is chiefly chrysotile, but the fact that some of it has a considerable degree of brittleness suggests that it may be amphibole. This is true especially of the small quantity of slip fiber which occurs sporadically in the serpentine. The veins of asbestos rarely attain 2 ins. in thickness. The larger ones are generally joined or banded parallel to the vein walls, thus parting the fiber into shorter lengths.

The most common type of asbestos bearing rock is banded by numerous minute parallel veins of asbestos, which range from a mere fiber to  $\frac{1}{4}$  in., rarely  $\frac{1}{2}$  in., in thickness. These cross fiber veins are so abundant in places that they form from 20 to 50% of the banded rock. The belts of banded rock range from a foot to several feet in thickness.

Much of the serpentine is covered by soil. Weathering is deep and impairs the asbestos near the surface. The best exposures of fiber are in some of the deeper shafts. This does not mean that the quantity of asbestos increases with the depth, but to some extent the quality may improve.

The highest grades, Nos. 1 and 2 crude, are practically absent from most of the area already prospected, but there are lo-

cally considerable masses of rock suitable for milling. They constitute, however, a small percentage of the whole body of the serpentine.

The serpentine is cut by the granite of the same region, and although the intrusion of the granite may be regarded as resulting in the formation of much of the asbestos, yet it must not be forgotten that the granite limits the serpentine.

#### ARIZONA.

Within the last few years deposits have been found on the north side of the Grand Canyon, 25 miles northwest of Grand Canyon station, in the vicinity of Bass Ferry. The Grand Canyon at this point is 4,500 ft. deep, and the asbestos occurs about 150 ft. above the bottom. When the river is low, it is crossed in a rowboat, but when it is high by means of a suspended ear. The most direct line of trail, when completed, will be about eight miles long, and transportation up to the rim is effected by means of burros, each animal carrying about 90 lbs.

The Grand Canyon exposes an excellent section of the Carboniferous, Cambrian, Algonkian, and Archean rocks. The Algonkian is markedly unconformable with the overlying Cambrian as well as the underlying Archean, and forms a wedge shaped mass with its edge along the canyon near its bottom and thickening rapidly to the north. The asbestos occurs in the basal portion of the Algonkian. This is made up, first, of a few feet of siliceous conglomerate overlain by about 50 ft. of variously colored fine shaly beds, locally calcareous or serpentinous. Then follows 15 ft. of whitish limestone containing layers and nodules of serpentine with more or less asbestos.

Above the asbestos limestone comes a heavy layer of compact diabase about 200 ft. thick, and above the diabase is a bed of limestone and shaly rocks similar to those immediately below the diabase. A little asbestos may be seen in the limestone above the diabase, but it is much more abundant in the lower limestone.

The asbestos bearing limestone below the diabase varies considerably from place to place, but for the most part has approximately the following section: Compact limestone, 1.8 ft.; serpentine with veins of asbestos, 1.2 ft.; banded whitish limestone, 12 ft.

The upper and lower portions of the limestone may contain some bands and nodules of serpentine, but they are not as persistent as the intermediate layer of serpentine, in which is found nearly all the asbestos. It occurs in cross fiber veins which lie parallel to the bedding in the limestone.

The cross fiber veins range from a small fraction of an inch to about 3 ins. in width, and are remarkable for their golden yellow color as well as for the tensile strength of the fiber.

The overlying diabase looks unaltered, and at its contact with the limestone is distinct, except where the top of the limestone is serpentine.

The facts observed in the field appear to indicate that the serpentine which includes the asbestos (chrysotile) is derived from some mineral in the limestone and not from the diabase. Conclusive evi-

dence concerning its derivation cannot be obtained until the rocks are examined in the laboratory. If the suggested conclusion proves to be true, the Grand Canyon asbestos affords a type quite different in origin from any yet found at other localities in the United States.

Four asbestos claims have been taken, one on the upper and three on the lower limestone, along which the thin belt of included asbestos bearing serpentine has been prospected in a number of shallow open cuts for over half a mile. The continuity of the narrow asbestos belt is very irregular, and disappears locally; but it is abundant enough in places to suggest the probability that Nos. 1 and 2 crude fiber carefully selected from the veins may be mined to a small extent at a profit. It does not seem at all probable, however, considering the limited quantity, location, and distribution of the deposit, that it would pay to mill.

#### CALIFORNIA.

Prospecting continues in the large mass of serpentine cut by the canyon of American river, two miles east of Towle, on the Southern Pacific railroad in Placer county, Cal. The canyon is more than 1,000 ft. deep and affords excellent exposures. Several tunnels have been run into the steep slope to the depth of 100 ft. or more. Small veins of short cross fiber and irregular sheets of strong flexible slip fiber have been discovered, but they are too sparsely distributed to be mined with profit for the fiber alone.

#### THE PHILIPPINES.

In the Philippine Journal of Science, also in the Far Eastern Review for June, 1907, Warren D. Smith gives an account of prospects of asbestos in Ilocos Norte, in the northern part of the island of Luzon. There has been no production, nor, indeed, much definite prospecting. It is certain, however, that there is a large mass of pyroxenite and serpentine in that region, and it contains locally some asbestos, part of which is fibrous serpentine, but most of it is of the amphibole type. It appears that the asbestos is sufficiently abundant to justify thorough prospecting with a view to determining its workability.

#### Venezuelan Duty on Magnesium.

Venezuelan decree dated May 11, 1908, fixes the export duty on natural silicates and carbonates of magnesium, known as dolomite, meerschaum, talc, soapstone, serpentine, magnesite, etc., at 1 bolivar (193 cents) per ton of 1,000 kgs. (2,204 lbs.). Those having contracts with the Federal executive for the exploitation of one or more of the aforesaid products will pay only the export duty stipulated in the contract.

**Quicksilver Trade of Great Britain.**—For the six months ending with June, the British imports of quicksilver amounted to 32,362 flasks (of 75 lbs. each), as against 37,385 flasks in 1907; while the exports were 11,332 and 15,089 flasks, respectively.

#### Clays in the Philippines.

BY ALVIN J. COX.\*

The common clays of Luzon are already used in several places in the manufacture of brick and crude pottery. For example, the brick kilns at Mandalayon and the one near San Pedro Macati, on the Pasig river near Santa Ana, each of which employs from 10 to 20 laborers, turn out from 1,000 to 3,000 bricks a day per kiln.

No sand is added to the clay before molding, but the whole bank is broken down, mixed by the tread of carabaos, and used for the bricks. At present there is no fine pottery being made on the island of Luzon. There is a factory near Manila which manufactures plates, cups, saucers, bowls, etc., and for these about 20 tons of the good Laguna kaolin are used every year.

The kaolin from Calamba employed in this pottery is too plastic when used alone, so it is recomposed by mixing with two varieties from Bulacan and Ilocos Norte provinces, respectively. Experiments are now being made with Mariguina clay. The quartz used is picked from the gravel which is being dredged from the Pasig river nearby; the asbestos which is placed in a layer between the plates in burning is from Zamboanga province. It is of very poor quality; probably a much better variety may be obtained from Ilocos Norte. The ware is dipped once for the silicious glaze before it is burned. The breakage is small, not exceeding 2 or 3% during the molding, drying, etc., and 4 or 5% during the burning.

Some of the ware is decorated in simple designs. It is difficult to describe the final product, which is quite similar to the English Delft ware.

This establishment employs eight men and the output is about 5,000 pieces per month. Formerly this ware had a large sale in Manila, but now is sold mostly in the provinces.

There are two men still engaged in bringing kaolin from Laguna province to the Manila market. The two sources are near Calamba and Los Baños from which are brought about 75 to 100 tons per year, respectively; it sells at wholesale in Manila for 23 pesos (\$11.50 U. S. currency) to 32 pesos (\$16) per ton. It is usually bought in 10-lb. balls and finds its principal purchasers among the Chinese of Binondo, who make of it a sort of whitewash.

The retail price varies with the supply from 25 centavos (12½ cents) a ball in the dry season to 40 centavos (20 cents) during the rains, the higher price being due to the difficulties encountered in transporting the clay to market. These may be judged from an account of the working of Calamba clay given by Señor de la Rosa. He says that the clay is dug and carried on the backs of natives about 7 or 8 km. to the harrio of Bucal, where the women make it into balls. When 500 to 1,000 of these are ready they are loaded onto bancas and taken about 4 or 5 km. to Calamba, where they are transferred to a casco and brought under tow to Manila.

The depth of the kaolin at Calamba has not been investigated, for after digging

down about 2 meters it becomes too hot to allow further penetration and then the washing of the rain fills up the hole. The superficial exposure is about a hectare. This kaolin has been used to some extent as a fire clay, for example, to repair the brick kiln at San Pedro Macati and the furnace of the glass factory. Señor Varona at the school in Sampaloc has made some fire bricks and crucibles of good appearance from this clay.

As the price of building materials of all kinds is very high and shows little sign of decreasing, the demand for clay products of this nature is sure to increase. Many which are now in use can be replaced entirely by manufactures from local clays, if their preparation is taken up and placed upon a commercial basis.

#### India's Petroleum Resources.

BY WILLIAM H. MICHAEL.\*

India has her oil fields, and when they have been properly developed will without doubt cut a considerable figure in the world's supply. At Kafir Kot oil exudes from brown bituminous sandstone, and is found floating on the surface of springs. It is also found in the Ratta Hotar hills, at Jabba, of Karsan, west of Chakratta, nine miles east of Kalaabagh; at Dhudur, three miles west of Kalaabagh, in the salt range; at Narsinghpur, also in the salt range; at Jabba, near Nampur; in the Algod ravine at Kafir Kot on the Indus river, and in other places.

The bazaar of Dehra Ismail Khan, on the hills of the Indus, had oil for sale as a medicine long before it was discovered in America, or had been developed in Burma. Petroleum was found many years ago in large quantity at a place called Makoom, not many miles from Jeypur, on the Dehing river, but the deposits have remained comparatively undeveloped. It is as yet unknown to what extent petroleum exists in India.

In Assam the wells near Digboi are the most promising, a company with \$1,550,000 capital operating a large refinery there. There are 22 wells near Digboi but five or six have been abandoned, as they were not sunk to a sufficient depth. However, while the deepest well is 1,865 ft., it does not yield as much oil as some that are little more than half as deep. The yearly output is now about 63 tons of candles, 573 tons of paraffine wax, and 1,200,000 gals. of kerosene oil. Nearly all the oil is sold locally in Assam, or in the neighboring districts of Bengal.

The government statistics do not show the amount of crude oil, refined oil, or paraffine wax derived from the Indian wells; but, whatever it may be, there is none of it exported from the country unless it be some of the wax. Burma (really a province of India) is the producer and exporter of kerosene oil and the by-products, such as paraffine. In 1906-7 Burma produced 137,654,000 gals. and exported 55,796,000 gals., all of it going to Indian ports. The exports of paraffine wax amounted to 60,299 cwt. (6,743,408 lbs.) valued at \$414,330. The candles made of petroleum products amounted to 5,095,000 lbs., valued at \$473,330.

\*Extract from Philippine J. of Sci., Dec., 1907.

\*American consul general at Calcutta.

# Accumulation of Gold on Stamp Mill Plates.

By W. F. A. THOMAS,\*

*Metallurgist.*

The statement once made to the author by the manager of a large gold mine on the Rand, that "every new plate in a gold mill will absorb and lock up about 70 ozs. of gold," seems to make a clearer general understanding of this subject desirable. Then, again, one frequently hears the statement, when a new mill has started with a disappointing return, that it was due to the absorption of gold by the new plates.

To what extent is this justified? If the two statements were combined one might jump to the conclusion that the first crushing return of a new mill is reduced by about 70 ozs. for each copper plate it contains. Such a conclusion, however, would require very considerable modification.

To begin with, it must be remembered that the gold on the plates may be divided into three classes:

1. The gold in the amalgam which is collected at every cleanup.

2. The gold in a scale of amalgam which adheres to the copper plate and is not removed in the cleanup.

3. The gold amalgam actually absorbed by the copper plate.

Only the last is irretrievably locked up and cannot be recovered without destroying the plate.

T. T. Read shows, by experiments made, that the amount of this absorption increases with the temperature, while its rate is influenced by the molecular structure of the copper—rolled engravers' plate absorbing more slowly than electrolytic sheet copper. He also says: "The effect of silver plating on the absorption of mercury by the copper is to restrain it at first, since the mercury has to diffuse through the silver. Eventually, however, the total amount absorbed is approximately the same." Probably therefore, the statement by Courtenay de Kalb that "the chief advantage of silver plating is to reduce the absorption of gold by the plate," should read "the rate of absorption."

The amount thus absorbed by a plate is probably in no case great. R. T. Bayliss gives the amount in a silvered plate, 4 ft. 6 ins. by 8 ft., after three years and 10 months' continuous use at the Drum Lummion mill, as 8.96 ozs. of fine gold. A. L. Collins gives the gold thus contained by plates, 4 ft. 6 ins. by 12 ft., of the Hidden Treasure mill, after 10 years' use, as 8 ozs. of fine gold.

Relatively small as this absorption is, it does not all take place in the first period of a mill's run, but accumulates in course of time. R. Gilman Brown made some experiments at the Standard Co.'s mill, Bodie, Cal., which showed that the absorption was greatest in the first two days, but after 14 days amounted to only 2 ozs. fine gold for a plate 4 ft. 6 ins. by 10 ft. The assay value of the pulp passing over the plate is not given, though this may affect the rate of absorption without influencing the total amount.

Now, with regard to classes 1 and 2,

*Conditions under which gold accumulates on mill plates. Recovering the precious metal by scraping with steel or rubber scrapers. American practice.*

*Absorption of gold by a copper plate in the long run will be less than 10 ounces. Muntz metal plates.*

there is no hard-and-fast line to be drawn between them. The proportion of amalgam that is left on the plate, forming a scale, depends on the method of scraping, whether with steel scrapers or only rubber ones, on the condition in which the amalgam on the plates is kept, whether wet, that is, soft, or dry, that is, hard, and other details governed by the experience and judgment of the millman and manager, taking into account the character of the ore and economic considerations.

As extreme cases the Drum Lummion and Hidden Treasure mills may again be cited. At the Drum Lummion mill the hard amalgam scale, removed from a plate, 4 ft. 6 ins. by 8 ft., after three years and 10 months' use, was 0.16 in. thick at the top and 1-16 in. at the bottom of the plate, and yielded bullion of the value of \$8,340.54. At the cleanups rubber scrapers only had been used. At the Hidden Treasure mill, where it had been the practice to scrape close with steel scrapers, plates 4 ft. 6 ins. by 12 ft., after 10 years' use, gave a yield of only about \$100 from the amalgam scale.

It is apparent, therefore, that a very wide range is possible at the discretion of the manager, in allowing the accumulation and temporary lockup of gold amalgam scale on battery plates. The reason for allowing the large accumulation at the Drum Lummion is given as the increased percentage of gold recovery by the coating, and the hardness of the scale preventing its removal with steel scrapers without injury to the plate. It is, however, still a question whether this extreme hardness of the scale could not have been avoided by the millman, thus allowing a much reduced accumulation to serve equally well for the recovery of the gold.

Such an accumulation of scale is, of course, a gradual growth, and, while the proportion held in the first month is probably in excess of that in subsequent months, the total amount of it must be distributed over the whole three years and 10 months the plate was in use. This would give an equal average of \$181 of bullion per month retained on the plate.

It is not known by how much the first month exceeded this general average, but it would have to be seven times as much to bring the total amount retained for the first month to 70 ozs. of fine gold, allowing, as seems fair from the figures

given above, 4 ozs. as the amount absorbed by the plate in that time. And this is an extreme case, for in the Hidden Treasure mill the amount retained in the first month, beyond the 4 ozs. absorbed, cannot have exceeded the amount after 10 years, that is, \$100, say 5 ozs. Subject, then to further data of facts ascertained at other mills being forthcoming, the following general conclusions would appear justified:

1. The amount of gold actually absorbed by a copper plate, 4 ft. 6 ins. by 8 ft. to 12 ft., is not likely in the long run to amount to more than 8 to 10 ozs., and generally not more than half of this, if as much, will affect the first month's crushing returns, though this proportion, depending upon the rate of absorption, is governed by temperature and other conditions affecting it.

2. The amount of gold retained on a plate in the form of amalgam scale is a variable factor, depending largely on the capacity of the millman and the discretion of the manager.

Though, apparently, there are cases where the amalgam scale is allowed to accumulate to a large extent, this is not the general practice, and in any case the accumulation during the first month, when the plates are new, will represent only a proportion of the final accumulation. (There are so many factors governing this proportion, that it is bound to vary in almost every case, and is anyhow next to impossible to ascertain.)

Thus it would appear that generally the first month's run of a gold mill with new plates is not affected by such a serious loss in locked up gold as is sometimes attributed to it, or inferred.

Finally, in connection with this subject, the author would inquire why Muntz metal plates are not more generally used. They should be cheaper than copper plates, they absorb practically no gold, the amalgam scale does not adhere to them so obstinately, and they are hence more easily cleaned up. What is the objection to them? Is it only that, because of the above, they require more frequent cleaning up and dressing? That seems scarcely a sufficient reason.

## British Copper Trade.

Imports of copper for the five months ending with May were: Metal, 44,056 long tons against 28,372 tons in 1907; regulus and precipitate, 31,903 tons against 27,679 tons; ore, 49,388 tons against 44,457 tons; making a total in fine copper of 67,401 tons in 1908, as against 48,879 tons in 1907—an increase of 18,522 tons, or about 38%.

Exports of copper for the same period were 27,380 tons in 1908 and 35,617 tons in 1907; a decrease of 8,237 tons, or 23%.

Certain alloys of iron with cerium, lanthanum, and other rare metals obtained from monazite possess the property of emitting brilliant sparks when scratched with a knife or file.

\*Abstract of paper read before British Inst. Mfg. & Met., May 21, 1908.

## Brazilian Railway Progress.

BY GEORGE E. ANDERSON.\*

Recently a contract was signed by the government of the state of Minas Geraes for the extension of the Leopoldina railway system from the present northern terminus at Santa Luzia north to Manhuassu and along the borders of the state of Espírito Santo to connect with the Leopoldina branch coming up farther west. This extension will not only open up a vast and fertile country about Manhuassu, but will afford rail and river connection with the port of Victoria for considerable traffic which now is handled by mule trains. The extension will be something over 200 miles.

The federal government has announced that it is concluding an arrangement with the Great Western railway of Brazil for the construction of a line from Campina Grande to Batalha, in the state of Parahyba do Norte.

According to the report of the minister of public works, there were added to the railway mileage of Brazil last year the following extensions, in kilometers (kilometer equals 0.62 mile): Ceara Mirim, 11; Baturite extension, 20; Great Western, 50; Victoria-Minas, 64; Central of Brazil, 40; Goyaz, 30; Bauru-Corumbá, 110; Sorocabana, 97; Sao Paulo-Rio Grande, 131; C. Auxiliare Chermis, 148; a total of 701 km. These 435 miles are scattered over the entire country, and represent general development rather than any particular project. The connecting of the Sorocabana and Sao Paulo-Rio Grande systems and the work on the railway to Corumbá represent the most extended work now in hand.

The last report of the Leopoldina Railway Co. is in some respects the best exposition of the situation of the railway business of Brazil. The Leopoldina is taken by European investors as the indicator of Brazilian business conditions. When the Leopoldina has a good year, Brazilian trade is good, and when it has a bad year Brazilian trade is not satisfactory.

The Leopoldina operates under a number of government guarantees, although it is privately owned and managed, and it therefore also measures railway conditions from the standpoint of the government roads and the private roads. The last annual report at hand shows that the Leopoldina operates 1,423 miles of road. During the year it carried a total of 2,481,340 passengers of all classes (there are three classes of passenger service in Brazil), for which the road received \$851,700, or about 34 cents per passenger. This rate includes suburban service, but not baggage, which is carried separately upon a separate charge in Brazil. The total amount of freight carried was 528,742 tons, for which the earnings were \$4,171,800, or about \$7.80 per ton. The receipts per train mile were \$314 and the expenses \$208. The consumption of fuel, wood, and coal was 32.92 lbs. per engine mile. The consumption of lubricants per 100 engine miles was 8.57 lbs.

The road has declared 4% dividends

on its stock for a number of years, carrying forward annually considerable sums for the upkeep and upbuilding of the road, for the equalization of dividends and for sinking funds. Much of the road reverts to the federal and state governments at the end of certain terms, although recent contracts for extensions are extending or doing away with such terms or reversions.

## New Publications.

Publishers are invited to send all books and pamphlets, treating of subjects relating to mining, metallurgy, chemistry and kindred industries, to the Review Editor of The Mining World. Whenever possible state selling price of publications.

*Quarterly Bulletin of the Canadian Mining Institute, May, 1908.* Edited by H. Mortimer Lamb, secretary. Montreal, Quebec; published by the Institute. Pages, 215; with map.

*Map of Minaret District, Madera County, California.* Lewis E. Aubrey, state mineralogist. San Francisco, 1908; issued by State Mining Bureau. Price, 22 cents.

This map shows the location of large iron deposits; also elevations, trails, creeks and important points.

*Webster's International Dictionary of the English Language.* Springfield, Mass.; G. & C. Merriam Co. Pages, 2,249; illustrated.

This is the authentic edition of Webster's unabridged dictionary, comprising the issues of 1864, 1879 and 1884 thoroughly revised and much enlarged under the supervision of Dr. Noah Porter. To the voluminous appendix is now added a supplement of 25,000 words and phrases prepared under the supervision of Dr. W. T. Harris, United States Commissioner of Education. It is to the credit of the publishers to say that the present edition of this highly authoritative dictionary will continue to perpetuate the efficient labors of its collaborators, and until we shall recognize Esperanto as the international language, the monument to the memory of Noah Webster need fear no competitor.

*Rocks and Rock Minerals.* By Louis V. Pirsson. New York, 1908; John Wiley & Sons. London: Chapman & Hall, Ltd. For sale by The Mining World. Pages, 414; illustrated. Price, \$2.50.

The fact that there are already a number of books which will aid the inexperienced to recognize rocks and rock minerals indicates that the subject merits the careful treatment which the present author has given it in his excellent little book. During the last 15 years it has been one of the author's duties to teach the elements of petrology to students in various branches of engineering, mining, chemistry, forestry, etc. The writer emphasizes the fact that his treatise has been so arranged that it will not be necessary to employ a microscope to identify rocks in a practical or technical way. There are other features besides the determination of the rock making minerals which will assure a place for this little manual in the library of geologists, engineers, miners, and others, who are interested in the subject.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 20 cents with the title, number, and date of patent to The Mining World. Remittances may be made by coin, stamps or postoffice money order.

WEEK, JULY 7, 1908.

Hoist. David E. Rowland, Canton, Ohio, assignor to The New Manufacturing Co., Canton, Ohio. (892,896; filed Mar. 12, 1908.)

Mining Machine. Rufus D. Secoy, Athens, Ohio. (892,904; filed Nov. 29, 1907.)

Hoist. Frank P. Snow, Los Angeles, Cal., assignor to Frank S. Livingston, Los Angeles, Cal. (892,907; filed Apr. 4, 1907.)

Automatic Bucket Dump. Nicholas J. Sweetney, San Francisco, Cal. (892,914; filed Apr. 2, 1908.)

WEEK, JULY 14, 1908.

Coke Oven. Matthew E. Rothenberg, Pittsburg, Pa., assignor to The Coal & Coke By-products Co., a corporation of West Virginia. (893,017; filed Jan. 12, 1908.)

Gas Producer. Edward N. Trump, Syracuse, N. Y., assignor to The Solvay Process Co., Solvay, N. Y. (893,114; filed June 1, 1907.)

Process of Reducing Vanadium from Sulphide Ores. Frederick M. Reckett, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a corporation of West Virginia. (893,128; filed June 26, 1907.)

Oil Burner. William C. Kirchhoff, Russell, Kans., assignor of one-third to C. Breckenridge Amix and one-third to John Walter Powell, Chanute, Kans. (893,172; filed May 19, 1907.)

Refractor. William T. Whiteway, Cambridge, Mass. (893,213; filed Mar. 14, 1908.)

Hydraulic Air Compressor. Peter Bernatowicz, Berlin, Germany. (893,222; filed Dec. 12, 1906.)

Conveying Apparatus. Robt. A. Chambers, New Glasgow, Nova Scotia. (893,224; filed Nov. 18, 1907.)

Pusher for Cement Grinding Mills. James W. Fuller, Jr., Cataumet, Mass. (893,226; filed July 13, 1907.)

Apparatus for Treating Ores. Duncan N. Hood, New York, N. Y., assignor to Hood Process Co., a corporation of Arizona. (893,242; filed Aug. 15, 1906.)

Ore Drier. Daniel T. MacLeod, Merchantsville, N. J. (893,232; filed Nov. 5, 1907.)

Filter. John T. H. Paul, Chicago, Ill., assignor to E. Goldman & Co., Inc., Chicago, Ill., a corporation of Illinois. (893,360; filed Jan. 16, 1908.)

Process of Refining Zinc. Richard Ziesing, Cleveland, Ohio, assignor of one-half to The Grasseil Chemical Co., Cleveland, Ohio. (893,415; filed Feb. 27, 1907.)

Coke Drawing Apparatus. Fred H. Daniels, Axel F. Backlin and Idolf Eklund, Worcester, Mass., assignors to H. C. Frick Coke Co., Pittsburg, Pa. (893,455; filed Nov. 16, 1904.)

Method of Producing Gas. William B. Dennis, Blackbutte, Oregon. (893,462; filed Mar. 10, 1908.)

Apparatus for the Recovery of Precious Metals from Slimes, Etc. Alphonso J. Forgas, Los Angeles, Cal. (893,472; filed July 21, 1905.)

Ore Grinding Mill. Charles D. McLure, St. Louis, Mo. (893,535; filed June 16, 1906.)

Ore Crushing Machine. Frederick R. Pettengill, Burbank, Cal., assignor to Samuel L. Kintner, Los Angeles, Cal. (893,540; filed Feb. 8, 1906.)

Apparatus for Refining Zinc. Richard Ziesing, Cleveland, Ohio, assignor of one-half to The Grasseil Chemical Co., Cleveland, Ohio. (Original application filed Feb. 27, 1907. Divided and application 893,560 filed May 4, 1907.)

Method of Recovering Metal Values from Solutions. Wilbur A. Hendryx, Denver, Colo. (893,581; filed Dec. 1, 1906.)

Method of Decolorizing Koaolin Clay. Etc. Karl Langsdorff, Huntington, D. C. (893,590; filed Feb. 17, 1907.)

WEEK, JULY 21, 1908.

Rock Drill. Robert H. Anderson, Germantown, Transvaal. (893,596; filed Dec. 27, 1906.)

Suction Gas Producer. John Bowey, Jr., London, Ontario, Canada. (893,604; filed Sept. 22, 1907.)

\*American consul general at Rio de Janeiro.



# Current Literature on Mining, Metallurgy, Etc.

**Handling Blast Furnace Bulion at the Selby Smelting Works.** James C. Bennett. Describes the cooling pot system, and the operation of the new method.—*E. & M. J.*, July 11, 1908; pp. 24; illus. 20 cents.

**Theory of the Settlement of Slimes.** H. S. Nichols. Critically considers the factors affecting the settlement of slimes.—*M. & S. P.*, July 11, 1908; pp. 24; illus. 20 cents.

**Gold Mining in Porto Rico.** William B. McKinlay. Reviews the history of gold mining, in this, the first part of an interesting article.—*M. & S. P.*, July 18, 1908; pp. 24; 20 cents.

**Cyanidation in the Malay States.** H. F. Loftis. The plant described is situated on the only working gold mine in the Malay states. The reef is a quartzite, lenticular, interbedded vein, and contains scheelite, antimony, bismuth and arsenic in the form of arsenical pyrites. Describes the trouble with treating sands containing antimony. The gold is precipitated from the cyanide solution by means of zinc and zinc coated with acetate of lead.—*Jl. Chem., Met. & Mg. Soc.* of S. Af., May, 1908; pp. 14. 60 cents.

**Promoting Mines.** I. J. Merrill. Outlines a plan for raising money to develop a mine.—*The Mining World*, July 25, 1908; 800 words.

**Winings and Wastings of Canadian Minerals.** Alex. Gray. Gives figures of production and exports, and refers to the organization and operation of the nickel trust, and to the working of the Cobalt mines.—*London Mg. Jl.*, July 11, 1908; pp. 14. 40 cents.

**Geology of Quicksilver Deposits.** Wm. B. Phillips. Tabulates the geological formation and associated rocks and minerals of quicksilver deposits.—*The Mining World*, July 25, 1908; 750 words.

**The Adair-Usher Process.** Alfred Adair. Describes the use of unher in slimes treatment, which by showing the possibility of reducing the time of treatment led to the Usher apparatus. The few residues obtained demonstrated the possibility of lowering sands residues by efficient tube milling, and as this material might contain a considerable amount of sand, it suggested a further advance in the apparatus.—*Jl. Chem., Met. & Mg. Soc.* of S. Af., May, 1908; pp. 94. 60 cents.

**Safety Devices for Mine Cages.** Charles Shewan. The device described by its inventor will support a mine cage when detached from the lifting rope and prevent overwinding.—*The Mining World*, July 25, 1908; 1,000 words; illus.

**Mining the Treadwell Lode.** T. A. Rickard. Describes the method of sinking and cutting stations to facilitate recovery of ore.—*M. & S. P.*, July 18, 1908; pp. 14; illus. 2 cents.

**Utilization of Byproducts from Coke Ovens.** W. H. Coleman. Describes the methods employed to recover the hydro-

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**ucts, tar, sulphate of ammonia, etc., in carbonizing coal.**—*Proc. Manchester Geol. & Mg. Soc.*, abstract in *The Mining World*, July 25, 1908; pp. 24; illus.

**Steam Pipe Covering in a Wet Shaft.** E. P. Kennedy. Describes the use of wood-stave pipe, the internal diameter of which is somewhat larger than the external diameter of the steam line. Asbestos rings or gaskets are inserted between the iron and the wood pipe, creating a dead-air space, which is the effect aimed at in all of the pipe coverings on the market.—*M. & S. P.*, July 18, 1908; 250 words. 20 cents.

**Employing Electric Power in Joplin District.** Doss Brittain. Continuation of a previous article; this describes the substations of the Spring River Power Co.—*The Mining World*, July 25, 1908; pp. 2; illus.

**Compressing Air by an Improved Method.** Jos. H. Hart. Describes the bucket-pump system of compressing air for mining work.—*The Mining World*, July 25, 1908; pp. 14; illus.

**Experimental Mill of the Nevada Cons. Copper Co.** M. L. Regna. Describes the equipment and method of operating the mill, and gives details of tests.—*M. & S. P.*, July 18, 1908; pp. 54; illus. 20 cents.

**South Extension Homestake Mineral Formations.** Francis C. Nicholas. Describes the origin and peculiarities of the great Homestake lode, and the geology of the Homestake South Extension mine.—*The Mining World*, July 25, 1908; pp. 3-1-6; illus.

**Milling and Cyanide Practice, San Prospero Mill, Guanajuato.** J. S. Butler. Describes the equipment and operation of the mill, and gives the results of cyanidation.—*M. & S. P.*, July 25, 1908; pp. 24; illus. 20 cents.

**Properties of Aluminum-Copper Alloys.** P. J. Carpenter and M. C. Edwards. Give analyses of the alloys and the results of experiments bearing on their industrial value.—*Rev. de Met.*, July, 1908; pp. 25; illus. \$1.

**Reinforced Concrete Tanks.** L. Mess. Describes the improvements made in the use of reinforced concrete for water tanks, coal pockets, etc.—*M. & S. P.*, July 25, 1908; pp. 14; illus. 20 cents.

**Valuation of Mining Properties.** George I. Gillespie. This is the first part of an interesting series; it discusses the valuation of properties which the writer classes

according to the contents of the ores: (1) Ore values, that are not subject to market fluctuations, such as gold. (2) Ore values that are subject to market fluctuations, such as silver, copper, lead, etc.—*Can. Mg. Jl.*, July 15, 1908; pp. 14. 30 cents.

**Making Pipe Joints Below the Water Line.** A. G. Knight. Describes a unique method of laying a cast iron bell with spigot, 14 ins. in diameter, which was used as a section pipe.—*Power*, July 28, 1908; 650 words; illus. 20 cents.

**A Modern Coal Washery in New Mexico.** Description of the plant of the Dawson Fuel Co.—*E. & M. J.*, July 25, 1908; pp. 24; illus. 20 cents.

**Metallurgy of Aluminum.** J. W. Richards. The two essential principles are "differential reduction" as used in the electric furnace purification of alumina, and "electrolytic furnace operation" as used in the decomposition of the alumina by electrolysis in the manner usually practiced. The latter problem is covered in the present article.—*Electrochem. & Met. Ind.*, August, 1908; pp. 14. 40 cents.

**Tailing Disposal at Mercer, Utah.** H. W. MacFarren. The practice described is in use at the Golden Gate mill of the Consolidated Mercer Mining Co.—*M. & S. P.*, July 25, 1908; 500 words; illus. 20 cents.

**The Operation of Electrical Machinery.** Norman G. Meade. Describes alternating current armature connections; keeping the voltage constant, and rules for the management of rotary converters.—*Power*, July 28, 1908; pp. 3; illus. 20 cents.

**Determination of Lead in Spelter and in Ores.** Eric John Ericson. Describes a new method for the wet assay of lead by means of a hydrogen peroxide reaction with potassium permanganate titration.—*E. & M. J.*, July 25, 1908; pp. 2. 20 cents.

**The Relation of the Percentage of Retort Metal in Anagum to the Gold Fineness in the Retort Metal.** Justin H. Haynes. The chart given is found to be very convenient and was in use for some time at the Liberty Bell mill at Telluride, Colo. It is equivalent to a rough preliminary assay of bullion obtained from amalgamation and where the proportion of gold to silver approaches the limit of parting, its value is at once apparent.—*West. Chem. & Met.*, July, 1908; pp. 4; illus. 75 cents.

**Lead Mining at Meckernich, Prussia.** Lucius W. Mayer. Describes the geology of the deposits and method of mining without the use of timber.—*E. & M. J.*, July 25, 1908; pp. 34; illus. 20 cents.

**Colorado Fuel and Iron Co.'s Plant at Alamosa, Colo.** Geo. J. Bancroft. Continuation of a previous article; this describes the mills.—*Mg. Sci.*, July 16, 1908; pp. 5; illus. 20 cents.

**Atlanta Gold District, Idaho.** Robert N. Bell. Describes the ore deposits and the method of developing the same. Also gives an outline of the Bagdad Chase mill.—*E. & M. J.*, July 25, 1908; pp. 14; illus. 20 cents.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

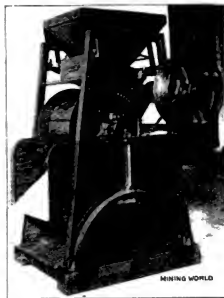
### A Novel Electro-Magnetic Separator.

BY FRANK C. PERKINS.

The method of operation and construction of a novel and interesting type of German magnetic separator may be seen in the accompanying illustration. An electric motor is mounted in the base of the machine in one form of the device, while for driving a countershaft pulley belt transmission is used in another type.

The path of the material, the arrangement of the magnetic cylinder and the tray for collecting the iron which has been separated, may be noted in the illustration.

It may be stated that the electric motors for driving these machines vary in capacity from 1-5 to 1 h.p., operating at a pressure of from 100 to 500 volts, and



Geist Electro-Magnetic Separator.

driving the separators at a speed of 180 to 200 revolutions per minute.

The magnets used for separating the iron from ore, sand or other material, require from 100 to 400 watts, according to the capacity of the machine. The cylinders picking up the iron and depositing it in a tray provided for this purpose. These machines have a capacity of sorting or collecting the iron from 600 to 6,000 kgs. of material per hour, picking up iron pieces weighing as much as 5 kgs.

A large number of the Geist magnetic separators have been installed in England and they have been utilized also extensively on the Continent at various mills, mines and iron and steel plants. The machines vary in height from 800 to 1,400 mm. and weigh from 110 to 1,700 kgs.

### Trade Publications.

*Pumps.* Lucas Pump Co., Dayton, O. Brochure.

Contains illustrations and descriptions of the company's line of power pumps and some space is given to self-starters for electric motors.

*Steam Specialties.* Ohio Brass Co., Mansfield, O. Catalog F; illustrated.

Is devoted to gage cocks, water gages, bronze gate valves and fittings. Each of these specialties is illustrated with short descriptions and prices.

*Tubular Products.* National Tube Co., Pittsburg, Pa. Booklet; illustrated.

This is designed for ready reference purposes, listing the products made by the company, ranging from merchant pipe, malleable iron fittings, cast iron fittings, etc., to seamless steel tubing.

*Peat Machinery.* Julius Bordolillo, Kingsbridge, N. Y. Catalog; illustrated.

Is devoted principally to machines for peat briquetting made by the A. Heinen Machine Works of Germany, for which Julius Bordolillo is the American agent.

*Stamp Mill.* Joshua Hendy Iron Works, San Francisco, Cal. Bulletin No. 113; illustrated.

Contains a detailed description of the Hendy improved triple discharge, 2-stamp mill, with complete specifications for mill equipment.

*Hoisting Machinery.* The National Equipment Co., 98 Jackson boulevard, Chicago. Pp. 40; illustrated.

Covers a wide range of machinery, including steam, electric and gasoline hoisting engines, derricks and derrick fittings, drop-bottom and clamshell buckets, pneumatic motor and cylinder hoists and lifting magnets. Other specialties include dump cars and wagons, concrete mixers, pumps and a portable stone crushing machine with conveyor attachment.

*Roofing.* Berger Mfg. Co., Canton, O. Pp. 24; illustrated.

Is devoted to the "Ferro-Lithic" roof slab, which is designed to meet the demand for a fireproof roof structure. It is said to be especially suitable for buildings exposed to smoke, acid fumes, gases and condensation of moisture. The system consists of corrugated, cross-ribbed, 24-gage steel plates, concreted on top and plastered underneath. In curved form these plates are adapted to floors sustaining heavy load.

*Engines.* Globe Iron Works Co., Menominee, Wis. Catalog No. 1006; illustrated.

Gives a description and illustration of the White gasoline engines in both stationary and portable types, which are described as the "hit and miss" and the "automatic," each operating on the 4-cycle principle. The electric ignition system and the arrangement of throttle, air and resistance valves are clearly illustrated in broken view showing the inter-

nal mechanism of these parts. A line drawing illustrates the proper setting and connections for the installation of the engine. Several types of portable outfits for well drilling, pumping and other service are shown in full-page engravings.

*Cyanide Plant Equipment.* Redwood Manufacturers Co., Balboa building, San Francisco, Cal. Catalog No. 3. Pp. 48; illustrated.

Is descriptive and illustrative of redwood tanks for leaching, cleanup, water and other purposes, wooden pipe, launders and zinc boxes which forms the general stock manufactured by the company. The company furnishes solution, vacuum and sand pumps, filters, zinc shavings, cyanide and all other fittings indicated by the title of the catalog.

*Rock Cutters.* Lobnitz & Co., Ltd., Renfrew, Scotland; Carr Bros., New York City, American agents. Catalog No. 7. Pp. 16; illustrated.

These subaqueous rock cutters work without explosives and consist of a heavy chisel of compressed steel weighing from 10 to 15 tons and fitted with a hard cutting point. This is allowed to fall from 6 to 10 ft. upon the rock. One ton of coal and the labor of four men is required, with an average result of 100 cu. ft. of rock broken per day.

*Pumps and Pumping Engines.* M. T. Davidson Co., 43-53 Keap street, Brooklyn, N. Y. Catalog. Pp. 96; illustrated.

Describes the company's complete line of pumping equipment, including pumping engines, air pumps, boiler feed pumps, gas works pumps, mining pumps, distilling apparatus, etc. Useful information, such as areas of circles, directions for installing and operating pumps, and tables of friction loss in pipes are given, and illustrations and sectional drawings of the several types of pumps are included.

*Locomotive Repair Parts.* Daveport Locomotive Works, Daveport, Ia. Catalog; illustrated.

Consists of carefully prepared plates, showing all parts of the locomotive construction in detail, which are numbered and referred to by code words for convenience in emergency orders. The proper method of handling emergency orders with the greatest dispatch is also outlined. The lubricators and injectors furnished by this company are referred to in detail to facilitate the ordering of repair parts.

### Industrial Notes.

The Deister Concentrator Co., Fort Wayne, Ind., has received an order for four of its No. 3 concentrating tables from the Florence-Goldfield Mining Co., Goldfield, Nev.

Extensive improvements are under contemplation by the Wisconsin Engine Co., Corliss Wis. An addition will be erected to the foundry and new cottages are to be put up for the employees, who will also have the privileges of a new club house.

The Modern Machinery Co., Stevens Point, Wis., has taken over the business of the Central City Iron Works and will

manufacture gasoline, traction and power engines, electric hoists, and a general line of structural iron for buildings, bridges, etc.

The Flake Graphite Products Co., has opened offices in the Terminal building, 30 Church street, New York city. The company will deal in graphite and its various products. Charles H. Sports, recently manager of the paint department of the Joseph Dixon Crucible Co., is manager.

William B. Scaife & Sons Co., Pittsburgh, Pa., has moved its New York office to the Havemeyer building, 26 Courtlandt street. H. F. Reynolds is in charge and will give attention to the line of structural steel work, steel tanks and barrels, water filters and water softening apparatus handled by this company.

The Rust Boiler Co., Pittsburgh, Pa., has established an office in the Hudson Terminal building, 50 Church street, New York, in charge of E. M. Rust. The growth of the company's business in the East has made the New York office a necessity. In addition to the general office of the company in Pittsburgh, there are also branch offices at Birmingham, Ala., and New Orleans, La.

The Laclede Christy Clay Products Co., St. Louis, Mo., announces the taking over of the business property and good will of the Jamieson-French Fire Clay Co., Lake Junction, St. Louis county, Missouri. Henry K. Lackland, formerly secretary and general manager of the Jamieson-French Co., will be associated with the Laclede-Christy Co. in the capacity of manager of its high-grade clay department.

The International Steam Pump Co., 115 Broadway New York city, will shortly begin making extensive improvements at its Snow, Dean and Harrison plants. Although the lists will call for only individual tools, the total expenditure will run close to \$100,000. The company is about to close on a large lot of forgings for gas engines, about \$200,000 being involved. Within the last three weeks its pig iron purchases have aggregated about 20,000 tons, practically all of which, it is stated, will be required for orders already booked. Activities are increasing quite appreciably at the big Harrison plant.

The merchandise creditors' committee of the Westinghouse Electric & Manufacturing Co. has issued another circular to the creditors relating to its reorganization plan. It reports that 95% of all the merchandise creditors have assented to this plan, and that it expects to secure the assent of the major part of the remaining merchandise claims. Substantial progress has been made toward securing from stockholders, employees and others the \$6,000,000 of stock subscriptions to assenting stock required by the plan. With the beginning of July a decided advancement was manifested in the business of the Westinghouse companies. It is stated that the business for June was 15% above that of May, and 23% higher than the business of the earlier months of the year. The past month's almost reached its normal point.

## Personal.

Walter W. Wishon of Los Angeles spent several days in Chicago this week.

D. P. Coates of Salt Lake, Utah, is on a professional visit to British Columbia.

James F. Haley has been appointed bullion tax collector for the state of Nevada.

S. F. Shaw is engaged in mine examination work near Jimenez, Chihuahua, Mexico.

Frank H. Probert of Los Angeles, Cal., has been making mine examinations at Globe, Ariz.

Solomon R. Gugenheim of the Gugenheim Exploration Co. has just returned from Europe.

Charles L. Cobb, president of the Jessup Mines Co. of Jessup, Nev., is visiting in New York city.

A. H. Cutright has been appointed manager of the Golden Treasure Mining Co., at Gold Mountain, Nev.

Edgar J. Knox, president of the Western Machinery & Mining Co., Reno, Nev., was in Chicago this week.

J. N. McPherson is general manager of the King Trail Development Co., with property near Bellevue, Ariz.

Marshall D. Draper has assumed the superintendency of the Fifty Mines Corporation at Black Hawk, Colo.

E. W. Clark, who has spent several weeks examining the Pioche district, Nev., has gone to the Ophir district.

J. F. Elsom of New Albany, Ind., has been examining mining properties in British Columbia for clients in Louisville, Ky.

John Lawson, general superintendent of the Canadian Copper Co., Sudbury, Ont., recently visited the iron ranges of Minnesota.

G. A. Du Bois, president of the Byron Jackson Iron Works, was recently in Redding, Cal., looking over the dredging field.

R. N. Bishop has been appointed general manager of the Trinity Copper Co. at Kennett, Cal., to succeed Austin H. Brown.

Harvey Watters recently assumed the management of the property of the Nevada Gold Circle Mining Co., at Gold Circle, Nev.

J. J. Hand has resigned the superintendency of the Sirena mine, the property of the Guanajuato Mining & Milling Co., Guanajuato, Mex.

Joseph Schlosser of Chicago, president of the Umatilla Mining Co., is at Elk City, Idaho, where the property of the company is situated.

W. P. Jahn of Milwaukee, president of the Pilot-Butte Mining Co., recently inspected the company's property at Butte, Mont.

M. Baumgartner of Spokane, Wash., operating mines in the Coeur d'Alene, has gone to the Pacific coast on business connected with his properties.

John K. Ashley, consulting engineer for the Midas Galena Mineral Co., located on Garfield Bay, Idaho, and also

deputy mineral surveyor for northern Idaho, has opened offices at Sandpoint, Idaho.

W. G. Rice, president and general manager of the Superior & Boston Copper Co., has been in Globe, Ariz., for some time on company business.

Dr. Wilbur A. Hendryx, manager of the Hendryx Cyanide Machinery Co. of Denver, Colo., has returned to Denver from a trip to Salt Lake city.

W. D. Egilbert, who recently sold 12 miles of dredging privileges on the Klamath river, has returned to Redding, Cal., after a trip through the Siskiyou territory.

J. H. Farrell, general manager of the New England-Arizona Mining Co., has returned to the company's property near Prescott, Ariz., from a several weeks' visit in the east.

P. C. Thompson of Salt Lake City, who is temporarily managing the interests of eastern men who have taken over the Ohio Copper Co. at Bingham, Utah, is in New York city.

W. L. Foster and J. H. Cave, civil engineers and licensed surveyors, have opened offices under the firm name of Foster & Cave, in the Lorenzo block, Sandpoint, Idaho.

Colonel Frank Ray of New York was recently at Gold Ray, Ore., on business connected with the enlargement of the electric plant of the Rogue River Power Co., of which he is president.

F. G. Clapp, for seven years past with the United States Geological Survey, engaged in investigations and reports on coal, gas, oil and artesian waters, has resigned for the purpose of taking up the expert practice of geology and related branches of engineering. A partnership has been formed with A. W. Bee, Jr., civil engineer, under the name of Clapp & Bee, geological engineers. An office has been opened in Pittsburgh.

## Technical Schools and Societies.

The Seventh International Congress of Applied Chemistry will be held in London from May 27 to June 2, 1909. An organizing committee has been formed for the purpose of making all arrangements for the holding of the congress in London. This committee consists of representatives of the following societies: Royal Societies of London, Edinburgh and Dublin, Society of Chemical Industry, Chemical Society, Institute of Chemistry, Society of Public Analysts, Royal Society of Arts, Iron and Steel Institute, Institution of Mining Engineers, Institution of Mining and Metallurgy, Society of Dyers and Colorists, International Association of Leather Chemists, Institute of Brewing, Royal Agricultural Society of England, the Lawes Agricultural Trust, Pharmaceutical Society, Royal Photographic Society, Faraday Society, London Chamber of Commerce (Chemical Trade Section), representing all the most important industries. Previous congresses have been held in Brussels (1894), Paris (1896), Vienna (1898), Paris (1900), Berlin (1903), and Rome (1906).

# Late News From The World's Mining Camps.

## ARIZONA.

Bisbee.

The new ore handling device recently installed by the Copper Queen Co. at the Sacramento shaft has just been tested and everything pertaining to its operation worked perfectly and the equipment will shortly be placed in steady operation. With this equipment the company will be able to handle 108 car loads of ore per day of 24 hours, providing only the present 3-ton skips be used. Five-ton skips can be used with the present equipment if at any time such a size should become imperative. The hoist can raise the ore at the rate of a skip a minute, or, approximately 108 tons or  $4\frac{1}{2}$  car loads per hour. Thus it takes but eight hours to fill the 36 waiting cars beneath the ore-loading device. The ore is weighed after it leaves the receiving hopper at the collar of the shaft and the exact amount of ore raised can be determined at any time of the day. At present the skips will be lowered only to the 1,200-ft. station, at which place ore bins and loading bins for the skips have been installed. With the system in operation not a moment lost in the delivery of the ore from the stopes to the awaiting ore cars on the surface. The system, it is expected, will prove to be the biggest improvement ever perfected by this company.

The Superior & Pittsburg is coming rapidly to the front. The Junction mine of its group has made an excellent showing in the past few weeks. Ore of commercial value has been encountered in several places. Ore is encountered daily, especially on the 1,200 and 1,300 levels and is becoming richer as distance is attained. On the 1,200 level, winze No. 2 off of crosscut No. 29, has reached a depth of 25 ft. all in ore, sulphides and oxides, which run on an average of 8% copper. A crosscut has recently been begun from drift No. 5 on the 1,300 level, which will be run to a point directly beneath No. 2 winze and a raise will be made in the ore to the 1,200 level. On the 1,300 level conditions are much better than last week, in nearly every respect the ore becoming richer. A new crosscut No. 23, has been begun which extends in an easterly direction from crosscut No. 11 and will be run to crosscut No. 21, a distance of about 170 ft. In No. 23 peacock ore has been encountered, which is identical with that encountered in No. 21 last week, some of it assaying as high as 40% copper. The peacock ore is widening out as it runs towards crosscut No. 21 where it appeared in the entire face of the working. It is the intention of the management to connect crosscuts 14 and 21 and block out this immense body of rich ore. Shipments from the Junction continue to be two carloads per day. The ore shipped runs on an average of between 7 and 14% copper. The ore is an easy one to handle at the smelter on account of the percentages of silica, iron and sulphur, it carrying on an average 11% silica, 34% iron and 29% sulphur.

## By STAFF CORRESPONDENTS.

The water problem at the Junction is becoming less difficult to handle recently. At the present time but 3,200 gals. are being lifted to the surface per minute. When the 1,500 station is cut, which will be in about a month, a 1,000-gal. crank and flywheel Prescott low-lift pump will be installed, together with one of the 2,500-gal. Mesabi pumps now located on the 1,200 station. The new station will be started on about Aug. 10.

The Denn-Arizona Co. has discontinued diamond drill operations on the 1,100 level. The reason of the discontinuing of this work is not definitely known at present.

The smelters of the Copper Queen and Calumet & Arizona companies at Douglas continue to operate along the same lines as during the past month. The output of the Calumet & Arizona this month will be between 3,500,000 and 4,000,000 lbs., while that of the Copper Queen will be about twice that amount.

The Calumet & Arizona smelter is undergoing many changes prior to the doubling of its capacity and on this account the output will be a trifle less this month than last. On the evening of July 27 this smelter suffered considerably owing to heavy rains in the valley west. An immense quantity of water flooded the smelter and drowned three of the five furnaces and also filled the slag pits and power house. The damage to the plant was not serious. The foundation for the new 500-ton furnace has been installed and the steel workers will arrive during the coming week to install the furnace, which will be running in about 10 days. The slag is at present being handled by the new system which has been in use for about 15 days, at a great saving of time and expense.

The Copper Queen is at present operating with seven furnaces and 10 converters. The reverberatory furnace is being relined after a most successful run.

At a meeting of the directors of the Butte & Arizona Copper Mining Co. held in Butte, Mont., last week it was decided to resume operations at the mines immediately, and a telegram was sent to Superintendent Casper. Schultz at Bisbee to that effect. The property of the company is situated at Hereford, about 35 miles from Bisbee, and as soon as supplies can be taken to the camp work will begin. The mine has been closed since fire last spring which destroyed the surface building and supplies. New buildings have been erected and repairs made and the property is now in better condition for work than before the fire. The property is being opened by adit now in 2,300 ft. and it is expected that the vein will be reached at a depth of 850 ft. from the surface in about two months.

The Chiricahua Mountain Copper Co., whose mines and extensive operations are at Llano, Cochise county, has just made a 60-ton shipment that netted \$17.79 per ton on a 9-cent basis for copper. The

property consists of 50 claims in which there are not less than 8 parallel veins that may be cut in a distance of 250 ft. Up to the present 450 ft. of work has been done, which includes a working shaft and several hundred feet of drifting. A new hoist has been ordered and as soon as installed sinking will be pushed.

Phoenix.

An ore body was recently struck in the Fumazole mine on Lynx creek in the Big Bug district, Yavapai county, two miles north of Poland and two miles east of Walker. The discovery was made in one of the properties belonging to the Leontina Mining Co. The pay streak is 3 ft. thick and rich enough in gold to ship. Of further importance is the fact that the strike was made in a hitherto unknown ledge, opened in a crosscut tunnel at a depth of 40 ft. The ore body is showing well as the work of opening it progresses. Several tons of shipping ore are already on the dump, taken out in running a drift on the lead. The working shaft is down to a depth of 165 ft. with good ore showing in the bottom. Drifting is in progress from the shaft on the 100 level with ore in face of the drift.

A crosscut tunnel is being run into the Mount Elliott property, also belonging to the Leontina Co., to tap three veins from the apexes of which good ore has been mined. This opening is now in 125 ft. and the management expects to cut the first vein of the series 150 ft. farther in at a depth of about 250 ft. Good water and timber rights are covered by the eight locations of the group.

Good showings of ore have been made lately on the Mazatzal Co.'s property at Jerome, Yavapai county. Samples from the bottom of the winze started on the Bull Frog tunnel, are good, and carry a good percentage in gold and copper.

The Octave Mining Co. in the Weaver district, Yavapai county, has a force of mechanics repairing the mill and air compressor and overhauling the hoisting plant, with a view to carrying on operations on a larger scale than ever before during the remainder of the summer and through the fall and winter months.

The Mildred Mining Co., at Walker, has recently opened some high-grade ore bodies and is piling shipping ore on its dumps.

Globe.

A fine showing of gold ore was made in the Savage mine, four miles east of Globe, the past week. The shaft is down about 24 ft. and carries the same grade of ore as when first discovered. The formation is getting less broken as depth is gained and the sides of the shaft show good ore. Considerable property is being done on adjacent territory, and a number of new locations.

Developments are showing in the Superior mine at Globe are satisfactory and work is progressing at a good rate. The east and west drifts from the bottom of the winze have been driven 12 ft. and 20

ft., respectively, and are in high-grade copper carbonate and glance. The drifts are at water level, 38 ft. below the 450 level.

Good progress is being made on the Superior & Boston Co.'s shaft on the Gardner mine at Globe, which is now down 275 ft. and on the Great Eastern regular ore shipments continue.

## CALIFORNIA.

### Quincy.

The McLellan, Hibernia, Southern Eureka, Aric and Antarctic quartz mines and 250 acres of placer lands have passed into the hands of a strong syndicate of Nevada mining men. Development work has already started and will be pushed from three points. The Pennsylvania tunnel in the Hibernia will be driven through the Southern Eureka to tap the large bodies of ore worked in the early eighties. This tunnel will cut the ledge 500 ft. below the old workings and will open up much territory. The ledge recently intersected in the McLellan will be vigorously developed. Explorations will be commenced in the Hibernia where some good ore has been taken out. Work will also be done on the other claims.

On the Smith hydraulic property in Onion valley the gravel is being prospected and is showing up well. Owners of adjoining properties are pushing operations.

Morrell & Rea have taken a bond on the Brush Creek, Ante Up and other claims near Mount House and are arranging for extensive developments. It is reported that they are acting in the interests of eastern investors. The Brush Creek was formerly a prominent producer of high-grade ore, but friction among the owners resulted in its being closed some time ago. It is announced that a large force of workmen will soon be put to work.

A strong ledge of high-grade quartz has been struck in the adit at the Twenty-One mine. The vein was encountered 400 ft. from the entrance and demonstrates the existence of excellent ore in a practically virgin section of the Allegheny district. It is thought that the vein is a south extension of the Tightner ledge. The Twenty-One is located south of the Tightner, approximately 1,000 ft. lower down.

At the Tightner, values continue to show throughout the ledge with good reserves of high-grade ore blocked out in the upper workings. A crosscut tunnel is being driven from Kanaka creek to intersect the ledge at depth. It is 950 ft. in and is expected to attain the objective within 200 ft. A large amount of work is going on at different points with satisfactory results. H. L. Johnson is owner and manager.

At the Plumbago, active work has exposed considerable ore of excellent quality. A small force of men is employed.

The Rainbow mill is running constantly and developments have exposed a large reserve of good milling ore.

Work on the Rainbow Extension is being pushed to strike the vein encountered

in the Twenty-One mine. It is located on the strike of the ledge and the management is confident of encountering ore soon. Murdock Morrison is superintendent.

The Allegheny and Forrest districts continue active. Several Colorado and eastern companies have recently become interested and indications point to one of the best years ever known in the section. Scores of prospectors are in the hills and many have located good claims. Several placer properties are being operated with good results.

The working force at the Brunswick mine has been reduced and only a small crew is now employed. Superintendent C. A. Mallen has resigned and his successor has not been selected. Several meetings have been recently held by the directors relative to the future of the mine. It is reported that the majority favor the sinking of a new shaft as suggested by the management.

At the Central shaft of the North Star mines sinking has been suspended and the shaft is being placed in shape for the cutting of stations at the 5,000 and 5,100-ft. points. An electric pump of large capacity will be installed near the 5,000 level to keep the lower workings free of water. Excellent ore has been developed at several points in the recently developed territory while the main ledge is showing well at numerous points. A. D. Foote is superintendent.

Preparations for the development of the ore bodies in the lower levels of the Idaho-Maryland mine is going forward steadily. The 700 level is being placed in shape for the running of drifts. Around the 500 level the ledge continues to show well with much high-grade quartz blocked out. The mill is running steadily on good ore.

Fourteen crews of leasers are working at the Champion mines, Nevada City. With the exception of two, all are making over \$3 per day. Two have earned over \$11 per day since starting work. The company is still awaiting action on the part of the English syndicate which recently acquired an option on the property.

### Rangor

The Big Blue Lead gravel mine, of which Nat. Lambert is superintendent, is now reported to be in pay gravel. The pay streak has been drifted on for 200 ft. from the main working tunnel. A drain tunnel is also being run. The Del Monte quartz mine, at Seneca, has been bonded to J. D. Murray of Rawhide, and H. H. Hunter of Reno, Nev. The ledge is 40 ft. wide with some free milling gold ore.

A tube mill has been installed at the Griss mine, on Ward creek, and will be run in connection with the 15 stamps.

A 500-ft. tunnel has been started to develop the quartz ledges in the Lucky S., at Kettle Rock, owned by Hafner & Carter of Crescent Mills. Good results are being obtained from the gravel deposit on the property.

The Goodline copper mine and ranch, at Shoshoni, has been sold to the Indian Falls Development Co. A town site has

been platted and development of both the gold and copper ledges begun.

The report of a rich strike in the Crown Point mines is verified by the bringing to camp by the owner, Henri Gobert, of two bars of gold worth respectively \$850 and \$120. Portions of the property are being worked by tributaries.

### MISCELLANEOUS CAMPS.

**Merced.**—Dr. O'Brien, manager of the Number Five gold quartz mine at Hornitos, purchased a few months ago by O'Brien and associates is preparing to erect a 10-stamp mill.

**Smartsville.**—Material is being assembled at Marigold for the construction of dredger No. 3 for the Marysville Dredging Co. This dredger it is said will be the largest on the Yuba river and will cost \$150,000, exclusive of the auxiliaries.

The old 30-mile ditch of the Paddy Campbell gravel mine has been cleaned out and refilled, and will be utilized in the irrigating service while the mine itself is being rehabilitated and prepared for service. The antiferrous gravel deposit to be worked is a large one.

**Minersville.**—The Fairview, once one of the best quartz mines in Trinity county, has, under the superintendency of Charles Doebler, been put upon a producing basis again with half the mill going. The other 10 stamps will be set dropping this month.

The La Grange Hydraulic Mining Co. has let a contract to Frank Dalton to haul 500 tons of steel railway rails from Redding to Weaversville. The rails will be cut into 4-ft. lengths for riffles in the sluices.

**Greenwater.**—It is stated on good authority that the shaft of the Greenwater & Death Valley Copper Co. is in ore at a depth of about 1,000 ft. The shaft recently broke into the ore, assaying 5 and 6% copper, but at the present time no idea of what the find will amount to can be ascertained.

## COLORADO.

### Denver.

The Kohinoor mines, which have been idle for about 20 years, are now being operated by Central City business men. They are working on a good body of ore, carrying principal values in gold.

The Hubert mines on the south slope of Gunnell hill have a record production of over \$4,500,000 and are sinking a shaft preparatory to opening up new territory. The vein averages from 4 to 5 ft. in width. The ore is shipped as it is taken out of the shaft while sinking.

Preparations are being made at the Kirk mine, under the management of J. W. Nesbitt, to make another large shipment of uranium ore. Recent shipments have the record of being the largest ever made by any mine. The ore was sent to the Krupp works at Essen, Germany.

The Gilpin Independence Mining Co., operating the Golden Flint mine and mill at Gambel gulch, cleaned up 40 ozs. of gold from a recent run, leaving concentrates worth from \$20 to \$30 per ton, which were shipped to the smelter. The average was about 2 ozs. gold to the

cord. The mill is running night and day on a vein of ore that averages from 3 to 15 ft. in width. The mine and mill are in charge of O. Q. Beckworth.

The large plant of machinery at the Topeka mines is being overhauled and preparations are being made to do extensive development. This group of mines was one of the heavy producers of the camp and will greatly increase the output of Gilpin when regular shipments of ore are begun.

The Oldtown mine, one of the great producers of the Russell district, has a shaft down 2,340 ft. on the dip of the vein and connects with a lateral from the Newhouse tunnel. This mine had been abandoned for about 25 years. George Kimball and associates secured the property about six years ago, when the shaft was 140 ft. deep. The shaft was sunk 2,200 ft. deeper, practically all in ore, with the vein increasing in value and width with depth. The company has paid over \$250,000 in dividends besides doing an enormous amount of development work.

On the Waterloo mines, owned by the King Bee Mining Co., a 2-compartment cage shaft is being sunk to the level of the Newhouse tunnel to develop its ore bodies. Three other shafts are also being sunk. Regular shipments are being made from the 20 ft. vein, the values running from \$4 to \$80 to the ton.

The Pewabic Cons. Gold Mines Co., operating on the Pewabic mountain in the Russell district, is working from four shafts. An extensive amount of development work has been done while at the same time making regularly shipments to keep the company's New York 150-ton, 75-stamp mill running continuously on a good grade of ore were made. These mines have produced, during the past two years, approximately \$300,000. J. C. Fieschlutz is general manager of the property, with Pittsburgh people as associates.

The Liberty Bell Mining Co., which has been driving a tunnel under Lexington mountain, in the Gold Dirt district, a mile up Sola Creek from Idaho Springs, has been able to do some very effective work during the past year. The company is contemplating putting in a plant at the tunnel for the purpose of driving more rapidly. The object is to cut several of the company's claims and to open up veins owned by other companies along the course of the tunnel. In this event it would become a transportation way. Lexington mountain has produced some fine high-grade gold ore. The Little Richards mine is also in line for an outlet. This tunnel is the only one crosscutting the mountain and all mine owners in that district are watching progress with a great deal of interest.

Dr. F. J. Crane, inventor of the Crane ore washing machine, and several associates, have leased the dumps of the old Caribon and Poorman mines in Boulder county and are installing a large washer and concentrating machinery of 200 tons daily capacity. They estimated that it will take from 12 to 15 years to consume the available material running at the capacity mentioned. Some of the ore runs \$125 to the ton in gold, silver and lead. The inauguration

of this enterprise has regenerated the entire district which has for years been practically idle.

Frank M. Marshall and associates have leased and are now operating the Shamrock of the St. Louis Co. in Boulder county. At the 225-ft. level, recently unwatered, they have opened up a 5-ft. vein. The mill stuff runs \$10 to the ton and the smelting ore \$75.

The values are chiefly gold. J. E. Allen and others have taken a lease and bond on the Idaho claim in the same district and are driving a drainage tunnel to clear out the water in the lower workings.

Other lessees are sinking a new shaft on the west 300 ft. of the St. Louis lode. They have exposed a 6-ft. vein that assays from \$8 to \$70 to the ton in gold and silver.

#### Leadville.

The Dinero tunnel at Sugar Loaf is 2,981 ft. in length and 294 ft. of driving will take it to the base of the Dinero vein. Since the first of this month the face has been extended 74 ft.

Gus Nicholson and associates, leasing on the Penrose, are shipping about 25 tons daily of very good iron ore. They are developing a great bed of iron which carries a little silver and is on the whole fairly profitable.

W. E. Bowden of Leadville, supported by eastern capital, is driving two tunnels into the Bordella and St. Kevin properties. The former is now 230 ft. in and is advancing about 4 ft. a day. The first known vein on the line is the Amity, which was tapped 15 years ago by the old Amity shaft and yielded over \$1,000,000. This shaft was sunk only 60 ft., but Thos. F. Walsh, who then worked the property, extracted a small fortune from it.

The old project of driving a drainage and transportation tunnel from Malta to the mines about Leadville which has been before the public for the past 20 years has again been revived and an attempt made to interest the local Board of Trade and outside capitalists in it. It is estimated that at least \$1,000,000 would be necessary to start the work and it is doubtful if this amount could be raised on such an uncertain undertaking. One of the strong believers in the project is Max Bochner.

#### Cripple Creek.

All things are looking well in this district. The output for July is placed at \$1,345,000, extracted from 65,062 tons of ore.

The Golden Cycle mill at Colorado City treated during July over 26,000 tons.

Another feature of the month's showing was the successful handling of stuff carrying only \$1.75 to the ton at the Iron-clad Cyanide mill, which gave a slight profit.

During August the Trilby mill will be in commission and the Blue Flag Co.'s mill will resume.

Orders to start up the big Independence mill at once are expected from London.

Johnson & Co., operating on the Anchoria-Leland, have just opened a body of ore 3 ft. between walls, most of

which is of smelting grade, assaying from \$40 to \$60 to the ton.

The Taylor & Brinton Sampling mill near Goldfield, one of the largest in the county, has been sold to George E. Copeland & Co.

The Mary McKinney has just paid its first dividend for over a year of one cent a share, which brings the total up to \$814,765.56. The property is reported to be in good shape and will pay dividends regularly hereafter.

The Golden Cycle mine is now putting out 225 tons per day of an average value of \$22 to the ton.

The strike made two weeks ago on the Ruby on Bull hill has developed into one of the biggest bonanzas of the district, ore running as high as \$22 to the pound having been exposed.

The output of the Stratton estate for July was much heavier than that for June. There are now 31 sets of lessees operating on Stratton ground.

Recent measurements of water in the El Paso lower level show a gradual decrease and it is probable that pumping will be resumed.

## IDAHO.

### Millan.

The Carney Copper Mining Co. has encountered the vein in the long crosscut tunnel which has been under construction for the past two years. The vein, where encountered, does not show as much ore as was expected, but it is the intention of the management to drift on it, believing that larger ore shoots will be met.

The Missiona Copper Mining Co. has started drifting west in the lower crosscut tunnel in an effort to find the ore shoot which failed to appear in the main crosscut. It will be necessary to drive about 400 ft. to get back under the surface showing. At present the drift is in a good vein which seems to improve.

The Snowstorm Mining Co. held its annual stockholders' meeting July 28, and elected the following officers: T. L. Greenough, Sr., president; W. D. Greenough, vice-president and treasurer; T. L. Greenough, Jr., secretary and general manager. The directorate includes above officers and H. E. Chaney, J. E. Heward, P. J. Kline and James Bean.

One of the richest shoots of ore ever opened in the Snowstorm mine was recently encountered. It is a dark blue and only red hematite in a quartz filling. The ore occurs in bands several feet thick running through the big copper vein. The new No. 1 tunnel is nearing completion.

The Copper King Co.'s new tunnel is rapidly taking shape and will be under active development in the course of a few weeks. The company is now erecting large boarding and bunk houses and a compressor building. The compressor will be driven by water power. There is a fall of 182 ft. which is estimated to develop at low water 33 hp. A 24-in. Type "C" Pelton motor will be used. A Franklin air compressor and "Chicago Giant" drills, made by the Chicago Pneumatic Tool Co., will probably be installed. Two shifts will be worked this winter.

The most important strike made in the

Coeur d'Alenes for six months has been opened in the Midnight tunnel in Mill creek, about two miles from Mullan. The property is under bond for \$150,000 to William Q. Ranft and associates of Missoula, Mont., and New York, who have been doing the development work the past winter. The Midnight vein was opened in the Federal Mining & Smelting Co.'s No. 5 and No. 6 tunnels, in both of which it showed fine bodies of ore, but the vein was not found in the tunnel run by the Midnight company until the present discovery. In this tunnel the vein shows about 6 ft. wide, 2 ft. of which is solid steel galena, which assays higher in silver than the majority of the ores of this district. Some samples give returns of 150 ozs. silver and 35% lead. The ore has not been explored to any extent. The Midnight vein is between the Morning and You Like veins, both of which are owned by the Federal Co.

The Hunter Mining Co. has a diamond drill at work in the old workings of the mine to bore a 10-inch hole through to the lower tunnel for air. Several holes will probably be put through if the first attempt proves successful.

A rich strike of galena ore has just been made in the Midnight property near here. This was made in a crosscut at a depth of 700 ft. and revealed 18 ins. of clean galena in a vein about 12 ft. wide. The same vein was crossed previously 300 ft. below and showed 19 ft. of concentrating ore. The present strike proves that the body apexes on the Midnight ground.

#### Sandpoint.

The property of the Bay City Mining Co. consists of a group of claims on Garfield bay, Lake Pend d'Oreille, 22 miles from Sandpoint. The Bay City claim is developed by a shaft and 230-ft. tunnel. The vein is 6 ft. wide in which the ore is silver-lead-copper carrying gold values and assays from \$6 to \$8 in gold, \$10 in silver, \$40 in lead and \$10 in copper to the ton. A contract has been let to do 60 ft. of work to connect the shaft with the tunnel. On the Bay View claim a tunnel is in 175 ft. and shows an 8-ft. vein running \$10 to the ton in gold, silver and copper. On the Snowstorm claim a 65-ft. shaft opened up the vein in three places which averages 3 ft. in width carrying values of \$30 to the ton in silver and lead. On the Doctor claim a 10-ft. shaft exposes a good showing of silver-lead ore. On the Sulphide claim a tunnel in 163 ft. opened up a 3 ft. vein of ore carrying gold, silver, copper and lead, averaging about \$24 to the ton. On the Gold Coin claim a 30-ft. shaft exposes a 3 ft. vein carrying values of \$10 to the ton. On the Carpenter claim is a 20-ft. shaft and on the Sunset a 30-ft. shaft exposing good silver-lead ore. E. E. Teap of Sandpoint is president and general manager.

#### Grangeville.

Great activity is reported from the Orogenide district, all men being employed, either on their own properties or for some company. Rich strikes are of frequent occurrence.

A shoot carrying rich ore containing considerable free gold was recent-

ly broken into on the Matilla mine. There are over 2,000 ft. of tunnel work on the ledge in this mine. The ledge has been crosscut 22 ft. from the foot wall without encountering the hanging wall.

On the Butterfly claims owned by Robert Puelz of Orogrande and Spokane, Wash., people several hundred feet of development work has been done and the lower tunnel on the vein is being pushed as fast as possible. Where the vein is crosscut by this tunnel it has a width of 17 ft. The ore is free milling and very rich. There is now several tons of pay ore on the dump. Unlimited water power is available.

A 400-ft. tunnel has been driven on the J. P. Morgan mines owned by Hokenson Bros. The ledge has been crosscut at several points and the vein has been found to average 12 ft. in width. The ore assays from \$10 up to hundreds.

#### Wallace.

The capacity or output of the Bonker Hill & Sullivan mine at Wardner is to be doubled by the addition of another mill of 1,000 tons daily capacity. The present mill is that size, which will make the output of the mine 2,000 tons per day when both mills are in commission. The new plant will be built in units of 500 tons each, one of which is already under construction. When this is completed the other will be started and when both are done the old mill will be temporarily closed and overhauled and brought up to date. The machinery for the plants will consist of crushing rolls, flies and classifiers. Wilfley tables, Card concentrating tables, Huntington mills, etc. The company employs 500 men. Only one shift is worked in the mine, this being sufficient to keep the mill crowded to 1,100 tons per day. The company has declared dividends amounting to \$16,251,000 and has approximately 3,000,000 tons ore reserve in sight and a great amount of undeveloped ground.

The Stanley Mining Co. of Burke has surrendered its lease of the New Jersey mill near Kellogg and proposes to erect a concentrator near Burke. This plan depends on the outcome of the litigation with the Hercules Co. whereby the Stanley Co. seeks an injunction to prevent the Hercules from dumping tailings on patented ground belonging to the Stanley. The trial of the Stanley ores in the New Jersey mill was not the success expected, the antimony interfering with the amalgamation process.

#### MISCELLANEOUS CAMPS.

**Silver City.**—The Silver City Mining & Milling Co. was organized July 2 under the laws of Idaho to take over the Abel Berg group of claims on the east side of Florida mountain. The following officers were elected: L. S. Honstead, president; J. H. Richards, vice-president; J. F. Cook, secretary and H. M. Land treasurer. A deal is pending for the purchase of the Blaine mill of the Trade Dollar Co., now idle.

**Hiscor.**—Thirty-five teams are at work hauling copper ore from the Peacock mine in the Seven Devils district to the railroad at Council for shipment to Ta-

coma for treatment. The ore is said to average about \$40 to the ton. It is the intention to ship about 500 tons per month as long as the roads will permit of wagon hauling.

**Iters.**—The Lost Packer Mining Co.'s smelter on Leon creek was blown in on July 5 and is reported to be running smoothly. The output is estimated at about five cars per month. The first shipment of one car of matte ran about \$15,000 to the car, the values being in gold, copper and silver.

**Hailey.**—Fred W. Smith and Peter Grandy, working on the West Dewey claim of the Dewey group at Hailey Hot Springs recently cut into a 6-in. seam of solid galena at a depth of 3 ft. Ten sacks of galena were taken out in drifting 51 ft. on the vein.

## INDIANA.

### Indianapolis.

Coal freight traffic during the past week was less than expected, but showed improvement. On a few of the lines traffic was up to the usual volume for this season of the year.

The Little Giant mine in the Linton field broke all previous daily records on July 29, when 45 Monon cars were loaded and 1,453 tons of coal hoisted. At the Crown Hill mile No. 2 in the Clinton field hoisting of the product of 300 miners was begun on July 29, after several weeks cessation occasioned by a strike, during which time the company took the opportunity to put in an electric haulage, which is now in successful operation. This mine is one of the heaviest producers in the state.

The Derring Co., now being reorganized, has shut down Old Oak Hill mine for repairs, but has reopened mine No. 7, where work had been stopped for two weeks for repairs. On the whole general conditions in Indiana are greatly improved and both miners and business men are looking forward to normal conditions in a short time.

The activity of James Epperson, state inspector of mines, in his efforts to make mines safer, resulted last week in the suspension of six mines and prosecutions of nearly 100 cases for violation of state mining laws. The Glen Ayr mine near Terre Haute will remain closed until the company complies with the state regulations. Latias creek and Pea Fry mines in the Greene County field, Vandalia No. 66 and Miami No. 2, have been permitted to resume operations after making changes. These mines are now in first-class shape and all requirements of the law have been met.

No. 33 at Hymera is still shut down. The mine was closed three weeks ago when the inspector found the company was running without a fire boss and with no escape shaft. Changes are being made and the company will resume operations soon.

Drilling ahead appears to be the common fault of miners and many prosecutions are necessary.

Several mines in the Washington field have been shut down and the inspector has filed a number of complaints. See

eral successful prosecutions were had for failure to provide ventilation and for drilling ahead.

## LAKE SUPERIOR.

### COPPER.

Houghton, Mich.

On July 26 the No. 2 shaft house and shop building at the abandoned Tamarack Jr. mine at Calumet were completely destroyed by fire.

Diamond drilling operations for the purpose of locating the Lake lode are to be begun at once by the Wyandot. Cross-cutting for the same purpose will also be carried on from the bottom of a 100-ft. shaft. This crosscut is now in about 100 ft. from the shaft and it is expected to cut the lode in about 800 or 900 ft. The crosscut entered conglomerate, which still continues, during the first 10 ft.

Rock from the Keweenaw is being put through the stamp mill at Phenix. As the rock is very soft the stamps should have a large capacity and there should be a correspondingly low cost of treatment. As this is a test run the rock is selected so as to be a fair average of the lode under ordinary working conditions, the desire being to determine what results may be expected in treating run-of-lode rock.

A new lode 30 ft. wide was discovered on the Adventure on July 24 by means of the diamond drills. Both the core and sludge showed rich shot copper throughout the entire width of the lode. A shaft to explore the lodes discovered will be started as soon as further results of the drilling now in progress are learned.

But little development work is going on on the Rhode Island. Two drills are operating and work is being done in the south drift, now in from the shaft nearly 900 ft. at a depth of 1,275 ft.

### IRON.

Marquette, Mich.

Conditions in the Lake Superior iron region continue disappointing. A few scattering sales of ore are reported, but the tonnage is greatly below expectations. The reduction made in price has had little effect in inducing furnacemen to enter the market. The product of the mines is moving slowly and there is little confidence now that conditions will show any immediate improvement.

Our cargoes are so scarce that the lake vessels now out of commission include materially more than half the wild tonnage and a considerable proportion of the ships of the transportation companies. Fifteen boats of the Steel Corporation's fleet have not been fitted out at all. A few inactive mines resumed operations during July, but they are of the smaller class. None of the big producers are adding to their forces and many are working only half time.

The Florence Iron Co., operating the Florence mine and the only producing property in the Wisconsin portion of the Menominee range, will ship approximately 100,000 tons during the remaining months of the season. The mine produces an ore of low grade. The operating concern is subsidiary to the Industrial Securities Co. of New York. There

is still considerable ore at Florence and at Iron River at the western end of the range the Florence Co. is developing the Hall tract, a property that gives excellent promise. The working force at the Florence mine is being doubled, having been reduced to the minimum.

Notwithstanding the present dullness in the iron trade, Pickards, Mather & Co. of Cleveland, Ohio, is not only opening new mines and pushing the development of older properties on the Mesabi, Gogebic and Menominee ranges, but is steadily enlarging its holdings. Next to the Steel Corporation this company is actively interested in more developed mines than any other operating concern in the Lake Superior region. These consist of 14 properties on the Mesabi range, six each on the Gogebic and Menominee ranges and one on the Marquette range. Aside from this, Pickards, Mather & Co. i. exploring a number of promising tracts, even on the Gayuna extension of the Mesabi, and has recently increased its holdings of mineralized lands in the Iron River and Stambaugh districts of the Menominee range, among others taking over the Winton and Berg properties. Pickards, Mather & Co. are already exploring in the same portion of the Menominee, and with very likely indications of adding the Swanson, Youngs, Rucholtz and McColman properties to their list of producers, which in that particular field comprise the Baltic, Caspian and Fogarty, all excellent mines. At Red Rock, at the northern edge of the Crystal Falls district, the big Cleveland concern is pushing the development of a deposit located by diamond drills some time ago. Shaft sinking is in progress. There is little doubt this property will become a good-sized producer.

The Cleveland Cliffs Iron Co., also of Cleveland, is operating a large number of mines, most of which are on the Marquette range, the others being on the Gogebic and Mesabi, and it is developing more and exploring for others. The bulk of its development work is in the Swaney district of the Marquette range, where it controls a very large acreage containing extensive deposits.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week ending Aug. 1 and for the year to that date were as below in pounds:

### LEAD ORE SHIPMENTS.

Camps.	Week. Aug. 1.	Jan. 1. Aug. 1.
Alba-Neck City .....	3,120	187,700
Aurora .....	39,350	214,820
Badger-Pearce .....	8,950	85,250
Carl Junction .....	129,350	1,162,500
Carthage .....	6,170	4,468,500
Cave Springs .....	11,220	900,750
Duenweg .....	35,600	2,501,851
Galena .....	158,610	4,102,372
Granby .....	16,200	98,590
Joplin .....	288,800	8,605,930
Miami .....	228,190	916,490
Oronogo .....	50,420	291,560
Peoria .....	1,930	13,300
Prosperity .....	61,340	2,393,350
Quincy-Hart .....	2,030	141,065
Seneca .....	154,560	1,545,560
Springfield .....	37,020	308,230
Webb City-Spring City .....	190,410	808,230
Webb City-Cartersville .....	541,587	22,247,477
Wentworth .....	134,660	1,346,660
Zincite-Sherwood .....	2,590	1,562,570
Total lbs. ....	1,598,817	45,712,431
Value .....	\$17,929	\$1,215,608

### ZINC ORE SHIPMENTS.

Camps.	Week. Aug. 1.	Jan. 1. Aug. 1.
Alba-Neck City .....	228,890	13,767,760
Aurora .....	392,400	9,847,760
Badger-Pearce .....	8,950	10,360,000
Carl Junction .....	1,162,500	1,162,500
Carthage .....	60,640	4,468,500
Cave Springs .....	900,750	900,750
Duenweg .....	721,060	17,685,260
Galena .....	859,410	21,771,770
Granby .....	455,600	12,612,610
Joplin .....	1,964,450	65,662,120
Miami .....	918,650	4,757,760
Oronogo .....	646,430	2,501,851
Peoria .....	141,065	141,065
Prosperity .....	20,990	8,761,145
Quincy-Hart .....	402,750	2,318,750
Reeds .....	171,810	171,810
Seneca .....	2,469,190	2,469,190
Springfield .....	55,070	94,670
Springer-Spring City .....	224,700	6,465,721
Stott City .....	182,500	182,500
Webb City-Cartersville .....	2,708,690	82,231,407
Wentworth .....	34,850	831,570
Zincite-Sherwood .....	1,562,570	1,562,570
Total lbs. ....	9,852,590	282,716,661
Value .....	\$150,456	\$4,747,765

The ore market for the week is much the same as last week. Most of the zinc ore sold went for \$34 to \$35 per ton for first grades. A slight advance in price is reported from some of the camps. Lead ore also showed gain. 80% grades selling on a basis of from \$58 to \$60 per ton.

Webb City, Mo.

The Yellow Dog lease north of Webb City is to close down this week. This will make the third of the large plants to close down recently because of low ore prices.

The Boston-Duenweg Mining Co. has discovered a rich deposit of zinc in the Martha E. mine in the Duenweg camp. On the 10-acre lease seven drill holes have been sunk, all locating ore. A shaft has been sunk breaking into ore at 160 ft. A drift will be run at 190 ft. Two 11-in. lift pumps have been installed as the water situation has become more serious since the closing down of the American Beauty a short time ago. Some lead was found in the shallow levels, though the deeper runs consist entirely of rich zinc blende.

The Easter Mining Co., also on the land of the Boston-Duenweg Co., has run five drifts at the 165 level. The drill showed good mineral which the shaft more than verified. The ore deposit extends in all directions from the shaft.

The Endeavor Mining Co. has just completed the new mill on the old Prudential lease in Porto Rico. A few more days will be required for the adjustment of the tramway and new equipment and the mill will then be operated. The air lines have been installed in the old shaft. The new shaft is now down to 40 ft.

In the Alba camp north of Webb City the Riverside Mining Co. has developed a rich prospect on North Fork north of Webb City. The shaft is being sunk deeper to take up a greater stope. Some heavy weekly outputs have been made since the company began producing.

The Holton Mining Co. has opened up one of the richest ore bodies found in the Alba camp for months. A drift is begun at 90 ft. and at a distance of 6 ft. from the shaft a rich body of zinc ore was encountered which has continued for more than 20 ft.

The old Jersey P. mine has been revived by a sub-lease. The old shaft was reopened and after running a drift from



the 90 level the ore body was entered which is as rich as any encountered in the camp. An adjoining mill was leased for treatment of the ores.

#### Joplin, Mo.

The Florence Mining Co., operating a lease on Turkey creek, has recently encountered some rich deposits of zinc ore at shallow depths. One shaft northeast of the mill entered ore at 75 ft. and continued for 25 ft. Another shaft entered ore at 14 ft.

A local company is prospecting and development on the Rex land east of the city. The drilling will be done on the eastern portion of the land where little prospect work has been done.

The Columbia mine at Bellville west of Joplin is to be reopened by Bendelarie & Cook. The pumps have been started and when the land is drained the shaft will be sunk 11 ft. deeper to catch the lower run of ore. The company has been working at 140 ft. and has taken out a large quantity of ore.

The Chitwood Bessie is another promising property in the same camp on the Leonard land. Three shafts are on this lease, one of which is known as the Lackawanna. A face of ore 42 ft. high is carried here. The drift in the lower runs averages 14% zinc and 1% lead.

The revival of activities in the Chitwood camp northwest of town is very encouraging. Some of the richest mines of the Joplin district have been located here, among which are the Conqueror, the Pelican, the John Jackson, the King Jack and the Diamond Jack have been great producers and are still producing.

Dr. Harry Gundling, who owns a number of properties in this camp, is preparing to make extensive improvements. A mill will be built at the Cumberland mine, which is well developed with three shafts in ore and 17 drill holes.

#### Galea, Kas.

The Herald Mining Co., which closed down its plant a few weeks ago, is busily engaged in further development work. The mill shaft has been sunk 25 ft. deeper during which time the company struck a large body of high-grade zinc ore with a considerable percentage of lead. The shaft is being sunk and will be continued until the full 70-ft. face of ore is exposed. The incline shaft will then be connected to the vertical one by an air drift which will increase the hoisting capacity of the mine. This development work will probably occupy two months, when the mill will be started and run to full capacity.

The Page ground near Riceville is being worked by George Elliott & Co. and several good prospects have been opened up.

A shaft is being sunk on the Blackhill lease by A. J. Flinn & Co. This ground in the early days was considered one of the best tracts in this camp.

The Mascotte mine on the Rambo lease is showing a good ore deposit. A shaft is being sunk which will enter the ore at 25 ft. The drill record showed a 26 ft. face of ore at this depth in five holes.

The mill on the 3-F lease was started a short time ago and the company is now

pumping to lower levels where very rich ore has been found.

A record run was recently made by the Hobo Mining Co. The Nebraska mill treated 76½ tons of dirt which yielded 15 tons of clean zinc concentrates and one ton of lead. This shows a saving of over 20% of ore from the mine run dirt.

#### Carl Junction, Mo.

The A. R. Allen Co., operating on the Jubilee lease south of the Carl Junction mine, has located ore in nine out of 13 drill holes. Some ore was found at 46 ft. though the main ore deposit was located at 75 ft. The zinc blende ores will run from 10 to 15%. A shaft is now being sunk by F. A. Carlson.

The Kramer mill will be removed from the mine north of town to the Kramer-Thomas-Reppy mine. A number of improvements will be made in the 100-ton plant before resuming operations at the new location. The sludge tables will be disposed of and new jigs installed, which will clean the ore sufficiently. The pumping has been completed and development work is being prosecuted.

## MONTANA.

#### Butte.

The Boston & Montana Co.'s mines were operated at but about 40% of their normal capacity during July, due to the shut down of the company's smelter at Great Falls as a result of the great damage done by the June floods. Because of the restricted output of the Boston & Montana the copper production of the Butte district was again considerably below the normal monthly production. The total was 26,234,900 lbs., against 13,159,000 lbs. in June, when all the mines were restricted to less than 50% of the normal production. It is expected that the Boston & Montana smelter will be in commission again by the middle of August.

The total ore tonnage, the estimated yield of copper per ton and total copper production contributed during July by the various companies are as follows:

Companies.	Lbs. copper		Total lbs. copper
	Tons	per ton	
Anacostia	111,600	71	7,923,600
Boston and Montana	46,500	80	3,720,000
Butte Coalition	26,350	90	2,371,500
Butte and Boston	29,150	70	2,040,500
North Butte	44,175	100	4,417,500
Original	37,200	82	3,050,400
Harriet	15,500	61	945,500
Pittsburg & Montana	4,650	80	372,000
Trenton	13,950	62	864,900
Washoe	17,050	68	1,159,400
Totals	337,125		26,234,900

The Tuolumne Mining Co. appears to be one of the first of the newer mining companies to develop pay copper ore. At a depth of 1,000 ft. it has just cut good ore in the first vein south of the shaft. After crosscutting south and drifting east several crosscuts were driven north again. The vein was first cut where the indications were that the ore had pinched out and another crosscut was made farther west with the result that good ore was found. The vein at that point is 26 ft. wide and there are 4 ft. of ore on the hanging wall and 2 ft. on the foot wall, assays from which showed 29.1% copper, 20 ozs. of silver and 80 cents in gold to the ton. The 6 ft. of ore is all

high grade, and the vein filling between the ore bodies assays 30% copper, 140 ozs. silver and 20 cents in gold. Drifting is being done to determine the extent of the ore and preparations are being made to sink the shaft several hundred feet deeper, during the progress of which work exploration and development will continue on the 1,000 level. The company is preparing a foundation for a complete new surface plant, including a 25 by 60-in. Nordberg first-motion hoist, with a capacity to work to a depth of 2,000 ft., three new boilers of 250 hp. each, a 15-drift compressor and a new galloway frame.

The Raven Mining Co. has resumed shaft sinking and will carry the incline from the 1,100 to the 1,300 level at least. At the same time development work on the 1,100 level is being continued.

The Pilot-Butte Mining Co., promoted by the same interests that organized and started the Butte & London, Colusa-Leonard Extension and the Reins Copper Co., all among the financial misfortunes, seems about to give up to adversity. The Milwaukee people who were to furnish the development funds for the company have, it is reported, failed to do so and no further work will be done on the Pilot by the company. The Pilot is exceptionally well situated, adjoining on the south the mines of the Butte & Superior Co. and the Elm Orlu mine of W. A. Clark. It lies west of and adjoins the Berlin claims of the North Butte Co. and has been developed by a shaft 500 ft. deep and by several crosscuts at that depth. The Pilot has several fine veins, but at the depth at which one has been opened it does not carry commercial values. About a month ago President John announced that work was about to be resumed and had the property examined by an eastern engineer, and it is now rumored that his report was unfavorable and on that the men who were to provide the funds withdrew. The Pilot-Butte Co. has an option on the ground that will not expire until sometime next year, but the surface plant is being removed and the supplies are being disposed of, indicating that the company has practically abandoned the property.

The recent negotiations to raise funds for resuming work on the Butte & London also seem to have fallen through and there are no prospects for an early improvement in the affairs of that company.

The Colusa-Leonard Co. stopped work early in the period of the panic last year because a New York firm which had made promises and efforts to finance several New Butte companies failed to do so.

The Reins Copper Co., which passed into the control of Colonel Guffey and associates of Pittsburg, may get on its feet again if the \$600,000 bond issue is successful. The proposition is to come before a special meeting of stockholders.

The stock of the North Butte Mining Co. has advanced considerably during the past two weeks. The company is producing copper, it is claimed, at a cost little in excess of 7 cents per pound and its monthly production is more than 4,000,000 lbs. The company has an issued capitalization of only 400,000 shares. #d

the advance in copper means a great addition to the earnings of the stock.

The Butte Coalition Co. is producing a quality of ore almost uniformly as rich as that of the North Butte, but the production is at present, and will be for some months, limited to about 850 tons per day. By the first of the year, and with the completion of the development work now being done through the Tramway shaft, the output will be fully 2,000 tons per day, counting on only the Minnie Healey and Rarus mines. In addition to these two mines, however, the Coalition Co. gets a share of the profits from the ore mined by the Boston & Montana Co. in the Red Penn ground and from the Parrot Co. on ore mined from the Nipper vein.

The Copper Eagle Mining & Smelting Co. has resumed operations, work being confined to the Eagle claim, upon which is a shaft 255 ft. deep, with 300 ft. of drifts at the 200 and 250 levels. From this superficial development the company has shipped 433 tons of ore from the 200 level, having a net value of \$8,353, and 656 tons from the 250 level having a value of \$25,000. The company is sinking the shaft 100 ft. deeper. Mining is also being done on the ore shoot on the 250 level.

Work has been resumed by the Cable Cons. Mining Co. on its property 16 miles west of Anaconda. The Cable has been worked for 40 years with varying success. It has produced about \$1,000,000 in gold and is still a good producer. The mine was closed last fall because of the failure of the Fort Pitt national bank of Pittsburgh, in which the company's funds were deposited. The Butte and Pittsburgh people who are interested in the Butte & Baccorn are largely interested in the Cable.

Robert H. Gross, the new president and manager of the East Butte Co., has completed his examinations of the property and the affairs of the company and will soon order resumption of work.

**Helena.**  
The new electric equipment of the Robert Emmet Copper Co., whose mine is about one mile south of the west portal of the Wickes tunnel, is about ready to be put in operation, all of the machinery now being installed. Arrangements have been made for 250 hp. of electric power from the Missouri River Power Co. The installation cost about \$25,000.

A company composed of Helena men has been formed to carry on mining operations in Blue Cloud gulch a few miles west of Helena where some valuable discoveries are reported to have been made recently. A shaft has been sunk below a hard pan, formerly supposed to be bed rock, and a rich bed of placer gravel was struck. Extensive drifting is now being done and 10 men are employed, but it is expected that this force will soon be greatly increased. It is the intention to install more machinery at once. The company was organized by Judge Henry C. Smith, William B. Potter and Van H. Fisk, all of Helena.

**Carter.**

A high-grade body of copper ore has

been exposed on the Swastika property in this district four and one-half miles from the St. Paul railroad. The property consists of 19 claims covered with timber. The ore is chiefly chalcopryite. The body is 6 ins. wide on the surface and exposed in many places for 1,400 ft. It is known to extend to a depth of at least 40 ft. The ore is said to assay 30% copper and \$6 in gold.

The main crosscut tunnel on the Glen Metals property at Carter is now into the hill 2,060 ft. Judging from the dip of the vein the tunnel should intercept it at a depth of 1,500 ft. below the surface workings. The tunnel is being driven at a cost of about \$9 per foot.

The Mountain Glen Co., which is developing its property on Deep creek three miles from Carter and six miles from the Northern Pacific railroad, is meeting with success. The group comprises 121 acres and has a strong and continuous vein.

The Carter Mining Co. has done about 500 ft. of work on its property between Four Mile and Slowey gulches, consisting of drifts, crosscuts, raises and surface openings. The vein can be traced 4,000 ft. on its strike. The pay streak, cut at a depth of 12 ft., has a width of from 3 to 10 ins. A raise was made to the surface in ore and 100 ft. of drifting done. The ore is said to average \$10 to the ton in gold, silver, copper and lead.

#### MISCELLANEOUS CAMPS.

**Phillipsburg.**—Sinking on the vein on Delaware group on Gird mountain at the head of Gird creek 16 miles north of Phillipsburg is being done and several men are at work. The group consists of six claims owned by J. F. Grebl and Thomas Higgins of Princeton and adjoins the Barnes Copper Co.'s property. The ore being taken out is reported to be of high grade.

**Saltese.**—The Monitor mine has resumed operations with a force of 27 men, under the management of O. H. Linn. H. F. Samuels and associates of Wallace, Idaho, have the property under option. It is the intention to sink the shaft 300 ft. additional, giving a total depth of 700 ft.

## NEVADA.

**Goldfield.**

An agreement has been reached between the Goldfield Cons. Mines Co. and the Jumbo Extension Mining Co., whereby the Cons. Mines Co. will dismiss the action brought in the federal court on February 18 enjoining the Jumbo Extension Co. from working its Wedge Fraction and leases thereon, tying up all the tunnels of the company and its several lessees, on the ground that the title to the ore bodies developed in the Gold Wedge claim belonged to the Cons. Co. by right of apex.

By the terms of the agreement, the Cons. Mines Co. waives all damages for ore extracted from the Gold Wedge claim and releases to the Jumbo Extension and to the lessees, all money tied up in the injunction. The Jumbo Extension

deeds the Wedge claim and also a one-fourth interest in the Vinegar Fraction to the Cons. Co. The Cons. Co. agrees to claim not more than one-half of the returns from any ore from the veins of the Jumbo Co.'s Polvereeder claim peeping in the Cons. Co.'s ground. The Mohawk Jumbo and Mohawk Ledge leases may now resume work. It is further agreed that any future differences between the two companies regarding apex rights shall be settled by a board of arbitration to consist of the chief engineers of the two companies, or, in case these cannot agree, they are to select a third engineer. The decisions of this board are to be considered final.

By a reorganization of the Baby Florence Co., which is reported to have come into control of the Rogers Syndicate, Lewis Rogers has been made manager. J. F. Meikle, former superintendent of the Rogers Syndicate, will be superintendent of the Baby Florence. A new air compressor has been installed and four power drills will be put to work. The property is now shipping from 15 to 20 tons per day of ore running about \$75 to the ton.

The Combination Fraction is now producing about 100 tons per day of ore said to average a little better than \$100 to the ton. Since the opening up of the shoot on the 300-ft. level there has been no lack of ore. Development indicates a shoot of increasing size.

The production of the camp for the week ending July 25 was 2,127 tons, 35 tons less than the week previous, but exceeded it in value by \$41,845.

**Hawthorne.**

Another strike of native copper is reported to have been made recently on the Mona claim of the Walker Lake Exploration & Development Co. in Cat creek eight miles from here. The ledge cut is 9 ft. wide and is streaked with native copper. Superintendent Andy Rank is in charge of the property. Frank House of Hawthorne is general manager.

The vein on the old Atherton mine of the Garfield group between Mina and Hawthorne has finally been relocated and a shipment of 62 tons of ore has been made. Owing to the badly faulted condition of the ledge the vein was lost some years ago and after an expensive and unsuccessful search the mine was shut down and remained so until recently.

**Pioche.**

Numerous additions to the mechanical equipment have recently been and still are being made at properties in the Pioche district. These include many gasoline hoists and air compressors.

The Anderson-Baker Mining Co. has a gasoline hoist and air compressor installed and in good running order. The property is now being developed, the work being in charge of W. L. Anderson.

The new gasoline hoist for the Pioche-Pacific Co. is on the ground and will be installed at once. A shaft has already been sunk and development work will be carried on.

Bids have been asked by the Pioche-Mohawk Co. on a contract to sink a 125-

ft. shaft on one of its claims. A new Buffalo whim will be installed as soon as the contract is let.

The installation of a 40-hp. gasoline hoist for the California-Pioche Co. has been completed and the sinking of a 2-compartment shaft to the 300 level has been started. No other development work will be done until this is completed.

The matter of the immediate extension of the Pioche-Caliente branch mine is now under consideration. The branch will pass several important properties.

#### Eureka.

The Nevada Development & Mining Co. is making preparations on the surface at its newly acquired Holly mine (formerly known as the Idaho) on Adams Hill, about two and one-half miles west of here, for the future development of the property. Three new buildings for machine shop, engine house and air-compressor plant have been put up. A galvanized frame 25 to 30 ft. high has been erected over the 200-ft. shaft for hoisting ore and rock. This shaft is well timbered to the bottom. There are about 1,200 ft. of workings in the mine, 1,000 of which is in mineral. The mine is said to have produced about \$175,000. It is the intention of the company to sink the shaft an additional 400 or 500 ft. and if the ore found warrants to put in a concentrating plant of ample capacity to handle the ore produced.

#### MISCELLANEOUS CAMPS.

**Manhattan.**—The suits filed against the application of the Manhattan Cons. Gold Mines Co. for patent, involving title to the western part of the Silver Pick No. 1 lode have been settled and all of the contested area has been deeded to the Cons. Co. Since the settlement prospecting on the involved portion of the Silver Pick claim has resulted in the discovery of a 4-ft. ledge of milling ore running from \$15.30 to \$32.50 to the ton. Sinking on this ledge has been begun.

**Virginia City.**—The output of the Comstock for the week ending July 25 was the largest in many years with four mines producing ore. The total exceeded \$30,000, being distributed as follows: Ophir, \$16,274.16; Cons. Virginia, \$5,229.55; Yellow Jacket, \$8,050.00; Silver Hill, \$708.00. It is the first time in almost 20 years that Cons. Virginia appears in the list of producers.

**Tonopah.**—The production of the camp during the week ending July 25 was in the neighborhood of \$115,000, perhaps \$2,000 or \$3,000 more. The output was as follows: Tonopah, 3,500 tons; Belmont, 850; Tonopah Extension, 130; Montana, 1,100; Midway, 100; MacNamara, 200; West End, 105; North Star, 80; total, 5,835 tons.

#### OREGON.

##### Grant's Pass.

The Alameda Mining Co. has cleared the site for its smelter and is laying the foundation for the big reduction plant. Much of the machinery and equipment has arrived at Merlin and will soon be hauled over Taylor mountain to the camp. The company has a number of men em-

ployed in the mine and a good body of ore is blocked out. The plant will have an abundance of material to operate on and will be kept busy in the treatment of the ores of this one property alone. Besides the Alameda properties there are a score of other mines in the immediate district now under development that will soon have enormous ore bodies uncovered. Some of these are shipping their product to outside smelters. The operations of the Alameda and several other properties of the camp make Galice the most active quartz camp in southern Oregon.

The Gold Road Mining Co. now has its cyanide tanks and concentrators in operation. The test run of this plant was highly satisfactory and demonstrates the stability and richness of the ore body. Jim Tyler has charge of the Gold Road Co.'s mine and plant. The headquarters of the company are in Philadelphia.

The Golden Pheasant group of claims in Galice district is being developed by J. E. Cross and associates. The values lie mainly in molybdenum veins and the showing of this mineral is such as to warrant development for operation on a big scale.

Other mines of the camp that are showing up well with development are the Oriole, Cold Springs, Sugar Pine and Golden Wedge.

A group of rich quartz claims in the Canyon district near the old mining camp of Kerby is being developed by the Telluride Mining Co., which is controlled by Seattle men, among whom are A. B. C. Dennison, former general passenger agent for the Great Northern railway, Samuel Bowden, formerly of Spokane, is manager of the company. It is the intention to begin extensive development at once. There is a good vein system on the properties and, while the development done thus far is shallow it proves the ledges to be of exceptional worth. Values are carried principally in Tellurides, the quartz being similar to Cripple Creek and Telluride, Colorado, ores.

#### SOUTH DAKOTA.

##### Deadwood.

The Tinton country northwest of here continues active and today there is more mining there than for a score of years back. Chief among the active companies is the Tinton Reduction Co., of which Edward W. Noakes of Chicago is the head and Capt. Edgar St. John is the superintendent. The company has 1,500 acres of patented ground, a small portion of which is over the Wyoming state line and the rest near the old Mallory placer diggings. The ore supply comes from the Wagon and Ready claim where there is a large ledge that is now supplying the mill with 25 tons daily, although the plant has a capacity of 100 tons. This product will be shipped to Liverpool, England, for the present as an English concern has an option on the company's ground. Later it is expected to ship to Pittsburgh. While the principal product of the mine is tin, some gold is present and the treatment plant is capable of extracting and saving both values.

The mine contains over 300 ft. of shaft and tunnel development.

Not far from the Tinton J. G. La Salle of Chicago has a force of men at work on his claims and is getting in shape for extensive production.

J. A. Blatt of Lead and August Schlehardt are developing their ground north of Nigger hill, on which they have been working at intervals for some years.

A. D. Ticknor is employing a force of men on his ground on Mineral hill two miles west of Tinton. In one of the Griffiths he has a good ore showing and is now crosscutting to tap a ledge that gave high values on the surface.

One of the most interesting and promising properties in the Rochford district south of this city is that of the Balkan Mining Co. This is owned and controlled entirely by South Chicago people. At the annual meeting just held the following officers were chosen: M. Ramonovich, president; John Shanowsky, vice-president; M. Milokovich, secretary, and Harry Groth, treasurer. It was decided to have the milling plant, now in course of erection, completed for a test run by next month. This plant is so constructed that if necessary it can be increased to 500 tons daily. A good hoist, buildings and machinery are on the ground. The ore body shows assays ranging from \$2.80 in gold to \$34.40 gold and \$3.60 silver.

#### UTAH.

##### Salt Lake.

The United States Smelting Co. has blown in another blast furnace. This gives the plant a battery of five furnaces in operation with two additional ones to go into commission in a short time.

One of the most encouraging features of the situation at the plant is the fact that the management is getting the desired results in treatment and the proposition of controlling obnoxious fumes and poisonous gases has been solved. By the new process of filtering of the smoke through the immense boughouse the vegetation of the adjacent property will no longer be destroyed or in any way harmed. Since operations were resumed at the smelter plant the company's concentrating mill has been placed in operation with a capacity of better than 300 tons of ore daily.

Manager Mangum of the new Knight smelter at Tintic states that the smelter will be ready for operation within the next 30 days. A large tonnage of ore is already assured.

The Knight interests, headed by Jesse Knight, have acquired control of the old Martha Washington properties in the Silver City end of the Tintic district. This property ceased operation several years ago after several unsuccessful attempts to locate ore deposits. The Knight interests recently took over the Dragon Iron properties, which adjoin the Iron Blossom, and they now propose to incorporate the Dragon Iron and the Martha Washington into one company and begin active operations on both properties at an early date.

Matthew Cullen has just closed a deal for the outstanding one-half interest of

the Rebel group of claims, which adjoin the Harrington and Hickory mines. The consideration is not named. The Rebel is one of the big producers in that section and shipped several hundred thousand dollars' worth of silver ore during the early days. Mr. Cullen has held a half interest in the property for a number of years. Work on a large scale on the property will be commenced in the near future.

According to officers of the Utah Cons. Mining Co., the present ore tonnage now blocked out at the company's mines in Bingham is sufficient for the supplying of 800 tons daily for at least seven years. The developments of the past year have added greatly to the available tonnage of the company, which is now of greater volume than at any previous time. The most important disclosures have been made in the territory north and west of the main workings, below the seventh level. In addition to the copper values thus made available there have also been disclosed some deposits running extremely high in lead, for the treatment of which commercial smelting facilities will be available in the near future. The product from the recently developed ore bodies is now being hoisted to the tunnel level through winzes, an electric power service having been installed for this purpose. This arrangement, however, is but temporary, as an examination of the company's workable territory is now in progress with a view of selecting the most advantageous point possible for a big operating shaft, which will ultimately command the company's entire territory, including its undeveloped ground to the west. The underground condition of the property has been raised to the highest possible standard with the result that the mining cost, including the items of taxes, insurance, working organization, etc., is now down to \$2 per ton, the lowest figure reached in the history of the company.

It is stated that development work on the Lost Josephine mine is to be pushed in the near future. The mine is located on Current creek in Wasatch county. A force of 20 men is to be put to work sinking a new shaft on the property.

## WASHINGTON.

Metaline.

The Metaline Mining Co., Ltd., owns the Davis group of eight claims on Slate creek in Stevens county, six miles from Metaline. The development consists of numerous shallow shafts and two tunnels just started. The ore lies in parallel ledges running northeast and southwest. The ores are mainly galena and carbonates of lead and assay about 80 to 84% lead and 12 ozs. silver to the ton. Five miles of wagon road has been completed. Buildings consisting of a bunk house, blacksmith shop and an office building are nearly completed. The property is under option to an English company, which gave \$100,000 for 51% of the stock. This option expires Oct. 1, 1908. This company owns a water power right on State creek which has a fall of 200 ft. A. B. Ralston of Spokane is president of

the company and W. K. Mead of Metaline, manager.

On the property of the Oriole Mining Co., consisting of three claims one mile west of Metaline a depth of 150 ft. has been gained at which point the first ledge has been cut. Development consists of one 40-ft. shaft, three tunnels and drifts. No. 1 tunnel is in 200 ft.; No. 2, 300 ft. and No. 3, 50 ft. Drifts run from No. 1 tunnel developed 5 ft. of high-grade shipping ore. A contract has been let to J. H. Piddle to drive No. 1 tunnel 100 ft. farther. The ore is said to give assays of from 50 to 100 ozs. of silver, \$22 in gold and 20% lead. Seven men are steadily employed. A. R. Raiton, Chas. J. Johnson, H. F. Snamiskee and others of Spokane are interested in the property.

The Mammoth and Morning glory of two claims two miles from Metaline is developed by two tunnels. No. 1 tunnel is on the line between the Mammoth and Morning claims. It is in 300 ft. and cuts 35 ft. of shipping ore at 140 ft. in from the portal. Fifty feet of drifting has been done on the vein which averages 4 ft. in width. No. 2 tunnel, 100 ft. lower than No. 1, is in 250 ft. and cut 45 ft. of milling ore. The formation is soft. The work so far done was for exploration purposes. A concentrator of 50 tons daily capacity is to be built, after which the property will be developed by open surface work, the entire property being heavily mineralized with galena. The Hallidie Machinery Co. has the contract for the installation of an aerial tramway 2,400 ft. in length from the mine to the steamboat landing on Pend d'Oreille river. A. R. Raiton, Fred. N. Davis and Charles J. Johnson of Spokane are heavily interested.

Newport.

The Parker Mountain Mining Co. has three patented claims on Parker mountain 30 miles from Newport on the Pend d'Oreille river. One shaft is down 125 ft. There is a 190-ft. crosscut tunnel from which a winze was sunk 65 ft. Seventy-five tons of ore from this tunnel is now on the dump. No. 1 tunnel is to be driven at a depth of 160 ft. No. 2 tunnel is in 360 ft. in ore and has a depth of 500 ft. The width of the ore body averages 5 ft. and the values \$17 to the ton mainly in lead and silver. No. 3 tunnel is in 230 ft. and has a depth of 700 ft. It will be driven to 300 ft. to tap the ledge under the shaft, with which it will be connected by means of an up-raise. The ore value in No. 3 tunnel averages \$26 to the ton and is increasing with depth. The property is equipped with two bunk houses, blacksmith shop and cook house. There are excellent steamboat transportation facilities. The proposed railroad to Metaline will be but one-half mile from the mine, with which it will be connected by an aerial tramway. The company is capitalized for \$200,000. Charles A. Fidler of Newport is manager.

## CANADA.

### ONTARIO.

Cobalt.

Shipments for the week ending July 25 amounted to 748 tons, bringing the total

shipments for the year to that date to 11,163 tons.

The shipments were as follows:

	Week.	Year.
	Tons.	Tons.
Buffalo	63,560	157,460
City of Cobalt	122,650	732,990
Cobalt Lake		342,168
Cobalt Central (Standard)	37,440	232,820
Cobalt Townsite		128,220
Conings	82,590	729,350
Crown Reserve		141,681
Drummond	109,720	298,510
Foster		178,400
Kerr Lake		612,244
King Edward (Watts)	40,180	189,030
La Rose	298,120	4,011,490
Little Nipissing		81,347
McKinley-Darragh	282,980	2,024,200
Nancy Helen		324,047
Nipissing	176,480	2,790,117
Nova Scotia		211,715
O'Brien	194,000	2,730,407
Provincial		151,880
Right of Way	67,180	457,710
Silver Cliff		12,000
Silver Queen		889,190
Silver Leaf		197,200
Temiskaming		328,040
T. & H. B.		576,920
Tretheway		1,491,499

Twenty-five men are now employed trenching on the Nipissing property in the limits of the town of Cobalt, and several new veins have been uncovered within the past two weeks. The most important find was made in a trench crossing Argente street, consisting of a very rich vein of smaltite and silver from 6 to 8 ins. wide. This vein is known as No. 100. Immediately following this discovery, a narrow but very rich vein of calcite and silver was located in a cross trench 200 ft. to the west. Four shafts are being sunk in the town limits, one of which, known as the Promise shaft, is expected to locate the extension of the La Rose Right-of-Way vein.

A large number of claims have been staked in the Miller Lake district and a minimum of prospecting done. So far as is known valuable discoveries have been made on the Gates claims originally staked last May by Cartwright and Le Heup and on the Bonals claims. The most important find so far reported is of a vein 3 to 4 ins. wide of smaltite and silver, which, from present indications, will prove as rich as the average veins in the Cobalt camp.

The controlling interest in the Moose Horn mines in James township has been purchased by New York men. George Harris has been put in charge of the developments of the properties of the company. An additional force of 20 men will be put to work trenching at once.

## BRITISH COLUMBIA.

Phoenix.

The Snowshoe mine in this camp is about to resume operation. Work will be commenced about Aug. 1 and by Aug. 10 it is expected that 150 men will be employed in and about the mine. Ore shipments will be made after Aug. 15. Last year a considerable quantity of Snowshoe ore was treated at the British Columbia Copper Co.'s smelter at Greenwood, but it is stated that the bulk of this ore will be shipped to the Trail smelter in the future, where it is used as a flux. The Snowshoe group was leased by the Cons. Mining & Smelting Co. of Canada two years ago and afterward acquired outright by them and also a num-

be, of adjoining claims. While the mine was working only nine months of the calendar year 1907 still 135,000 tons of ore was gotten out. The Cons. Co. has spent many thousands of dollars in development work on this property, equipped it with new electrical and air-compressing machinery.

The Granby Co. is shipping up to the standard tonnage. The British Columbia Copper Co. has its new, big compressor working steadily now. A 20,000-cu-ft substation is being built on the property and other improvements in the way of self-camping cars, etc., are being made, which, when completed, will enable the company to ship 2,000 tons of ore per day.

The Dominion Copper Co. is shipping steadily from its mines including regular shipments from the Mountain Rose, the ore of which runs high in iron and is valuable as a flux.

The following are the shipments made from the mines of this district during the week ending July 25 and for the year to that date:

	Week Tons	Year Tons
Brooklyn .....	2,220	2,220
Crescent .....	25	25
Emma .....	13,626	13,626
Granby .....	21,817	601,263
Mother Lode .....	9,761	67,716
Mountain Rose .....	30	225
Oro Negro .....	3,370	21,928
Skylark .....	1,470	8,610
Sally .....	30	30
Snowflake .....	367	367
Stimmet .....	495	2,202

Some good ore has been opened up on the Tip Top, in the Skylark camp, where development work is being actively carried on. Work has been resumed on the Diamond-Texas after a considerable period of idleness. The Greenwood tunnel proposition is at a standstill at present, owing to the death of one of the promoters. Work is shortly to be resumed on the Fremont and Prince Henry properties.

## MEXICO.

### Cananea

Two more furnaces were blown in by the Cananea Cons. Copper Co. on July 27, making a total of four in operation, or one-half the capacity of the smelter. C. F. Shelby, superintendent of reduction, states that when the entire eight furnaces are running the output will not average less than 1,000,000 lb. per month for each furnace. This increased production will be realized by a total operating cost as low as, if not lower than, that which existed before the shut down last November.

Contracts were closed last week by Dr. L. D. Ricketts of the Greene-Cananea Copper Co. and E. W. Freeman, manager of the southwestern sales division of the Texas Oil Co., with headquarters at El Paso, Texas, whereby the latter named company agrees to deliver at Cananea, within two and one-half years, 1,000,000 barrels of fuel oil. The contract calls for shipments to begin at once. The Texas Oil Co. will supply the cars and from 150 to 200 cars per month will be delivered. All the oil will come from Texas and Oklahoma points.

Chas. Hohstadt of Douglas, Ariz., has

located a silver claim near Cos., on the Nacozari railroad, that is showing up well. He has denounced about 15 pertenencias surrounding it.

The Naldez Mining Co., which is owned by Douglas and Bisbee, Ariz., people, has a gold property about 12 miles west of Cos. A stamp mill has recently been erected and Manager Adams states that the company will shortly be in a position to begin shipments of bullion. The same people also own a placer claim within three miles of the Naldez property that has made a good showing, carrying values as high as 50 cents gold to the cubic yard. With the coming of the rainy season it is expected that hydraulic pumps will be put to work.

J. F. Humphrey of Cananea has denounced a gold claim in the Yo mountains, east of here, from which samples have been taken assaying \$60 to the ton.

The people of Baciachi, a village about 25 miles south of Cananea, are meeting with considerable success in panning out small amounts of gold in the mountains lying directly east of that place.

The 1200-ton concentrator that is being installed at the Cerro Colorado in the Altar district will probably be finished by the end of the year.

Jas H. Kirk, mine manager of the Cananea Cons. Copper Co., and H. E. Kirk, assistant superintendent of the mines of the same company, have lately denounced 150 pertenencias of prospect ground about 20 miles west of Cos., near the Oso Negro mine, which was owned by them about six years ago.

The tunnel of the Industrial Mining Co. has been driven about 128 ft. and satisfactory progress was made. It is believed that it will reach the ledge by September and will cut the ore body found in the shaft at a depth of about 100 ft. below the cropings.

H. A. Pomeroy, formerly superintendent of the King of Arizona mine and later on manager of the Llanos de Oro mine in the Altar district, has taken the management of the Cerro Prieto mines in this state.

Francisco Castro of Nacozari has recently returned from an extended prospecting trip in the Tabalacachi district, where he located and denounced a large claim which promises to be a valuable silver property.

### Oaxaca.

A recently discovered mining district on the Rio Hondo near San Carlos Yantepe is attracting considerable attention from prospectors. The new district is said to be very promising, but the distance from transportation is such that its development will not be rapid.

Exploration work on the recently discovered bonanza at the Natividad mine in the Sierra Juarez has shown that the high-grade ore body is one of the largest ever uncovered in Oaxaca. For many years the Natividad has been the largest producer in the state and with the recent find it is attracting attention from all parts of the republic. The ore body has been explored for 90 ft. in length and 2 ft. in depth at several points. Ore of very high grade is being sorted and ship-

ments of several tons are being made weekly. The lower-grade ore is being treated at the mill on the property.

The Santa Lucia mine in the Ejunta district which has been closed for the past few months has been reopened and the shaft is being unwatered. It is the intention of the management to sink the shaft 40 meters deeper and to crosscut the vein at that point.

If not delayed by rain, it is expected that the new mill going up on the El Carmen mine in the Sierra Juarez, will begin the treating of ore on September 1. It is expected that the mill will save from 95 to 96% of the gold and as high as 85% of the silver. As the rains thus far during the rainy season have not been hard enough to injure the well-made road into the Sierra it is hoped that the season may pass without any interruption in the transportation of machinery and ores to and from the Sierra Juarez.

The Cia. Minera del Duende, which is the operating company of the Duende Mining Co., has applied to the local court for registration. The Mexican Co. has been capitalized at \$2,000,000. By forming an operating company of small capitalization the stamp tax in Mexico is greatly reduced. The offices of the Duende Mining Co. are in Chicago. The erection of a gallows frame on the main shaft of the Duende mine has been authorized and a steam plant will be installed at once.

After running a tunnel over 1,000 ft. the vein has been cut on the La Cumbre mine in the Magdalena district. Drifting has been begun on the vein and the smelter officials state that the values are satisfactory. This mine is being relied on to furnish the lead for the smelter.

The protocolization papers of the Commonwealth Mining Co. have passed from the court to the notary. The company, whose home office is in Boston, is operating the Humbloldt mine in the Ocotlan district.

### Guadalajara.

The Virginia & Mexico Mining & Smelter Corporation of Hostotipaquillo, Jalisco, has in transit from the Westinghouse Electric & Manufacturing Co. of Pittsburg, Pa., whose agents for the Republic are Messrs. G. & O. Braniff & Co., some 15 electric motors totaling over 300 hp. to be used in connection with its new mill. This power will be largely used for belt drive. There is to be a 50-stamp mill, each 15 stamps to be driven by a separate 30-hp. motor. A 20-hp. motor will drive 10 Wilfley concentrating tables. One 30-hp. motor will be used to drive three crushers, and a second to operate air-compressor, mechanical agitator and vacuum pump. These last are for use in connection with the slime agitation and the Butters filter press which is to be installed. Another 20-hp. motor will be installed to drive three solution pumps and three Frier pumps. A 10-hp. motor will operate a Roblins belt conveyor for handling the sands. This mill is to be one of the most modern in the Republic. Jesse Sobey is manager of the property.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to The Mining World who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

Frank Rockefeller has resigned as a director of the Orphan Copper Co. of Arizona.

Charles C. Clapp & Co., of Boston, Mass., are promoting the Amalgamated Mining and Milling Co. of Pachuca, Hidalgo, Mexico, which was incorporated under the laws of Arizona. The authorized issue is 1,000,000 shares 12½ preferred stock, and 1,000,000 shares common stock, both \$1 par value. The preferred stock is redeemable at company's option after Jan. 1, 1914, at the then market value but not less than \$1.15 per share. Preferred dividends are cumulative after Jan. 1, 1910. The officers are Hedley Ludlow, president; Felix Diaz, vice-president; Sidney Ludlow, treasurer, and R. A. Mills, secretary. The directors are Hedley Ludlow, Sidney Ludlow, Felix Diaz, W. H. Armstrong, and Richard T. Seley.

### Official Reports.

#### FRONTENAC COPPER CO., MICHIGAN.

On April 30, 1908, the assets were: Cash at mine, \$5,071; cash at Boston, \$22; total, \$5,093. Liabilities: Notes and bills payable, \$96,086. The debit balance is \$91,002.

#### MANITOW MINING CO., MICHIGAN.

President Shaw reports the assets on April 30, 1908, as follows: Cash at Boston office, \$1,117; cash at mine, \$3,270; bills receivable at mine, \$21; total, \$4,417. Liabilities: Notes and bills payable, \$199,388. The debit balance is \$194,971.

#### GRATIOT MINING CO., MICHIGAN.

The assets on April 30, 1908, as reported by the Calumet & Hecla Mining Co., which owns 50,000 shares of Gratiot stock, were: Cash at Boston office, \$491; cash at mine, \$11,721; total, \$12,213. Liabilities: Notes and bills payable, \$80,867. The debit balance is \$68,654.

#### LA SALLE COPPER CO., MICHIGAN.

The company now owns 51,633 shares out of a total issue of 54,265 shares of the Tecumseh Copper Co. Assets on April 30, 1908, were: Cash at mine, \$7,384; cash at Boston and securities, \$742,422; notes receivable, \$131,669; total, \$870,755. Liabilities: Bills and accounts payable, \$1,197. The balance of assets over liabilities is \$868,558.

#### TECUMSEH COPPER CO., MICHIGAN.

President Agassiz reports that there was produced during the year ending April 30, 1908, copper to the amount of 59,875 lbs. from rock mined previous to 1907. The openings are not yet sufficient to warrant continuous milling of rock.

Assets on April 30 were: Cash at Boston, \$890; cash at mine, \$8,863; total, \$9,753. Liabilities: Notes and bills payable, \$137,929. The debit balance is \$128,176.

#### COSTA RICA ESPERANZA MINING CO.

Treasurer Tilden reports as follows for the 11 months ending May 31, 1908: Ore crushed, 8,161 tons; tailings leached, 2,060 tons; extraction by amalgamation, \$379,769; extraction by cyanide, \$23,516; total extraction, \$403,285. Deducting for cost of operating and shipping \$107,563, and for betterments, \$10,716—total, \$118,279—leaves a profit of \$284,506. The profit for the corresponding period in 1907 was \$41,211.

#### MARY MCKINLEY MINING CO., COLO.

During the fiscal year ending June 30 there was produced on company account 7,235 net tons with an average gross value of \$25.31 per ton, or \$183,261 in all. Deducting expenses of \$142,120 leaves a net saving of \$41,141. On lease account there was produced 3,851 net tons with an average gross value of \$17.85 per ton, or \$68,741 in all, from which the company received royalties amounting to \$11,201. The company's net profit from ore sales was \$52,411, and from other sources \$2,506, making a total of \$54,917.

#### TOMBRAH MINING CO. OF NEVADA.

The quarterly report for May 31, includes the operations of the Desert Power and Milling Co., as follows: Net value of ore shipped to Desert mill, \$770,238; mining and milling expenses, \$419,767; net earnings for quarter, \$350,472. Adding miscellaneous income of \$6,583, makes a total of \$367,115. After paying the regular dividend of 25¢ on par, \$1, or \$50,000 in all, there remained a surplus for the quarter of \$317,115. Cash on hand May 31 was \$320,082, and after deducting the dividend of \$20,000 the balance is \$300,082.

#### INDIANA MINING CO., OREGON.

Treasurer Stappish reports that the total amount of money received from all sources since the organization of the company in June, 1903, to June 1, 1908, is \$132,197, all disbursed. For the period from June 15, 1907, to June 1, 1908, cash receipts were \$111,257, of which \$12,498 had been brought forward from the previous year. Disbursements were \$111,257. The cash at the western office on June 1, 1908, was \$75, and there was due the company from stockholders, \$11,754. Since 1908 there has been donated to the treasury 255,000 shares of stock, of which 27,408 shares remain unsold. The company owes for money advanced during the past eight months \$12,479, and other obligations are \$12,137 for note and inter-

est and \$2,914 due at western office. The company owes for the last payment on the 88-acre ranch that was purchased for \$62.50 per acre; the amount is \$3,897, due Oct. 1, 1908, and upon which interest is 8% from April 1, 1908. The total indebtedness of the company, not including interest, amounts to \$31,157. The mine is equipped with three boilers, 225 hp.; one Leyner geared hoist, capable of lifting 250 to 300 tons of ore to the surface every 21 hours; one friction hoist, used for shaft sinking; one Cameron sinking pump, capacity 3,000 gals. an hour; one Janesville pump, 6,000 gals. an hour; one Fairbanks pump, 10,000 to 12,000 gals. an hour; any depth to 500 ft.; one Leyner steam actuated 2 stage air compressor, can operate four large or eight small drills, a set of pipe cutting and machine tools, full set of blacksmith tools, cages; five ore cars; blowers; about one mile of 8-in. T. & L. pipe, of 1, 1½ and 2½-in. pipe used for steam, and air pipe conveying compressed air to the drills underground, and 500 ft. of 3-in. water column; about 350 pieces of drill steel; miners' tools, such as picks, shovels, rock hammers, and many other small tools. The surface buildings consist of the machinery building, housing the machinery and shaft; three men's houses; boarding house and complete cooking outfit; office; blacksmith shop and stable.

#### JESSE KNIGHT PROPERTIES IN UTAH.

The different mining companies comprising the Jesse Knight group in the Timb district, Utah, reported as follows under date of July 1:

Indian Queen Cons. Mining Co.—Cash balance on hand, \$6,620; treasury stock, 186,000 shares.

Mountain Lake Mining Co.—Cash, \$21,166; treasury stock, 122,435 shares.

Thex Gold Mining Co.—Cash, \$3,019; treasury stock, 33,200 shares.

Utah Treasure Hill Condition Co.—Cash, \$116; treasury stock, 8,700 shares.

Mineral Flat Mineral Co.—Cash, \$1,665; treasury stock, 123,125 shares.

East Tintic Cons. Mining Co.—Cash, \$1,963; treasury stock, 163,000 shares.

Colorado Mining Co.—Bills payable, \$38,369. Ore is being shipped to the United States Smelting plant at Bingham Junction.

Beck Tunnel Cons. Mining Co.—Bills payable, \$16,905.

Black Jack Cons. Mining Co.—Bills payable, \$21,120. The assessment of 3 cents a share just levied will go toward discharging the indebtedness. The company has secured additional territory of value, and with the assistance of some iron ore shipments, together with the assessment, will be able to meet all obligations and carry on development work.

Iron Blossom Cons. Mining Co.—Cash, \$39,822; treasury stock, 100,790 shares. Iron ore is being shipped from this ground.

Crown Point Cons. Mining Co.—Cash, \$19,349; treasury stock, 122,000 shares.

Iron ore to the amount of 89,242 long tons was exported from the Krivoi Rog district of Russia last year, principally to Germany and Great Britain. In 1906 the total exports were 462,294 tons.



## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise

(See also Market Reports)

[illegible]





[illegible]

### Assessments Levied

[illegible]

## Dividends of Foreign Gold, Silver, Lead and Copper Companies.

No.	NAME OF COMPANY.	Authorized Capital, in stock.	Issued and Paid in	Dividends on Issued Capitalization.			Latest Issue.	Amount
				Total to Date.	Total to Date.	Total to Date.		
21.00	Amatlay y Comandis, g. a. s. a.	Mex...	800,000	800			Apr 15, 1906	1.00
22.00	Amador y C.	Mex...	100,000	100			Mar 31, 1907	1.00
23.00	Barreno y C.	Mex...	12,000	5			Sept., 1906	1.00
24.00	Barceloneta Medina Mill	Mex...	100,000	100			Apr 1, 1907	1.00
25.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
26.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
27.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
28.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
29.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
30.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
31.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
32.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
33.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
34.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
35.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
36.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
37.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
38.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
39.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
40.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
41.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
42.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
43.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
44.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
45.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
46.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
47.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
48.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
49.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
50.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
51.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
52.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
53.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
54.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
55.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
56.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
57.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
58.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
59.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
60.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
61.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
62.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
63.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
64.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
65.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
66.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
67.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
68.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
69.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
70.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
71.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
72.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
73.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
74.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
75.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
76.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
77.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
78.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
79.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
80.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
81.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
82.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
83.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
84.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
85.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
86.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
87.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
88.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
89.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
90.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
91.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
92.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
93.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
94.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
95.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
96.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
97.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
98.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
99.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00
100.00	Batallas, s. a.	Mex...	5,000,000	50			Oct 78, 1907	1.00

### Capitalization and Dividends of U. S. Mines and Works.

**Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies**

[illegible]

Copper led in Aug. 6, 1981

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\* Illustrated

## Conservation of the Coal Resources.

The United States Geological Survey has been an important factor in this movement for many years, and while its work has been to a certain extent altruistic in that the immense benefits will come to the generations of the future, it has already saved millions of dollars worth of resources for the people of today. The Geological Survey's geologic and topographic work have resulted in an inventory of the natural resources, a stock-taking such as a prudent manufacturer makes once a year. This has disclosed the waste that has been going on, and led directly to the conference of the governors. The value of the mineral deposits on government land has been approximated to such an extent that it will now be impossible to dispose of them without getting a fair return.

The report that the Greene-Canaan Copper Co. would hereafter utilize oil for fuel instead of coal is another indication that the competition between the two products is sure to become more active. There are several advantages in using oil for fuel at metallurgical works where transportation costs are not prohibitive. Oil fuel is cleaner than coal, and considering the fact that oil can be imported into Mexico at comparatively low costs from California or Texas, the market there should grow rapidly. Moreover, the Mexican government has recently removed the duty on fuel oil imported into Sonora, where the Greene-Canaan mines and works are situated.

In its endeavors to check the great waste of the natural resources, the Geological Survey a few years ago extended its field by taking up the subject of the utilization of the fuels of the country. Authorized to test the fuels owned by or the use of the government itself, the Geological Survey has made a number of important discoveries. At the government's fuel testing plant it has been shown that the gas engine is capable of generating from 2½ to 3 times as much power, using a given amount of coal, as can be obtained from a steam engine. This means, it is declared, that a 600-h. p. gas engine will save \$5,000 a year in its coal bill over the same power steam engine, and that the saving on a 6,000-h. p. gas engine ought to amount to \$72,000 a year.

The gas engine has also opened the way for the use of millions of tons of low-grade fuel, much of which has heretofore been thrown away as waste. The tests have shown that coals practically valueless under steam boilers by reason of their high percentages of impurities have generated sufficient power in the gas en-

gine to render them of high commercial value. Coals as high in ash as 45% have been used successfully in the gas engine.

In the west, where the supply of high-grade coal is inadequate, the low-grade lignites of North Dakota developed as much power when converted into producer gas as did the best West Virginia bituminous coals when used under the boiler of a steam engine.

In the average steam engine today but 5% of the coal energy is transformed into work. In the gas engine this percentage of efficiency is 12½%. The coal used in generating power in the United States last year amounted to about 300,000,000 tons. With the universal use of the gas engine, it is estimated that at least 100,000,000 tons of this coal could be saved.

In testing the efficiency of coals under the boiler of a steam engine, the Geological Survey engineers suggest still another way to save the fuel. Recent experiments indicate that boilers ought to perform two or three times the work they do now. In New York city a certain large corporation has almost doubled the capacity of its power plant by placing furnaces in the rear of its boilers as well as the front. This was done at a saving of several hundred thousand dollars, as it would have been necessary to purchase additional land held at a high figure to carry on the work.

The tests of different coals under the steam boiler at the government plant have also shown the possibility of increasing the general efficiency of hand-fired boilers 10 to 15% over ordinary commercial result.

The Geological Survey is also engaged in a general analysis of the coals of the country. These analyses have resulted in the government purchasing coal on definite specifications based upon its heating value. Under this system a better grade of coal and coal better adapted to the types of furnaces in the government buildings has been obtained without any increase in cost, which in itself is a saving to the government.

These investigations, by suggesting changes in equipment and methods are also indicating the practicality of the government's purchasing cheaper fuels, such as bituminous coal and the smaller sizes of anthracite, instead of the more expensive sizes. With new boilers in the heating plant of the State, War and Navy building in Washington, \$15,000 is now being saved each year in the coal bill for this building alone.

Many power plants are now buying fuel on specifications and have obtained increased efficiency as a result of the government's investigations. These tests of

the coal will aid manufacturers wherever situated to save money in the purchase of coal, for they will enable them to learn where they can buy coal that is best suited to their purpose.

The government has found still another way of conserving the fuel resources in the briquetting of coal. The investigations show that in the near future the great quantities of waste coal seen about every mine and the low-grade coal that is now being left in the mines will be utilized in generating power and for locomotive use and domestic heating. Successful tests of briquets were recently made on two railroads. The briquets, which were made from the slack of high-grade bituminous coal, showed an economy of 20% over the same lump coal, not taking into consideration the cost of making the briquets.

At the government fuel testing plant at Denver, Colo., investigations into the washing and coking of coal have been carried on for a year with much success. In the washery plant it has been shown that coals were greatly improved by washing at the nominal cost of 3 to 10 cents a ton.

In recent experiments, the experts have succeeded in making coke out of several coals that have been regarded as noncoking. Of 37 samples tested from the Rocky mountain region all but three produced good coke, though a number of these were considered noncoking coals. When the metallurgical interests of the west are noted, the importance of these investigations will be realized.

#### Nitrate of Soda Combination.

There is every reason to believe that the nitrate of soda producers' combination in Chile, which has a very remunerative monopoly in the world's markets, will be renewed for another five years, beginning April 1, 1909.

During the regime of this combination, the consumption of nitrate of soda, as a result of the intelligent propaganda which has been carried on at some expense, has grown enormously. Prices also have advanced, and what was at one time an industry suffering demoralization from competition, has become so prosperous as to permit the payment of good dividends to shareholders who had despaired of ever again realizing an equitable interest on their investment.

Great Britain and Germany are largely interested in the oficinas; in fact, have in recent years greatly increased their investments, which has aroused the jealousy of the Chilean producers. It is suggested that this ill-feeling may lead to unserved discussion when the new combina-

tion is to be formed, but considering that foreign capital is backing up the more important enterprises, and that the Chilean government has benefited greatly from its export tax on nitrate of soda, the proposed conference of producers may be expected to terminate satisfactorily.

A question likely to vex the committee in charge of allotting the individual quotas of production, which are to be based on the consumption, is the increased number of new works that are eligible for membership in the combination. The older oficinas have already experienced a heavy cut in their original quotas to accommodate the new plants, and naturally will argue against a further reduction.

The world's consumption of nitrate of soda in the last fiscal year was approximately 1,715,858 long tons, principally in the agricultural, powder and chemical industries. Of this quantity the United States consumed 345,639 tons, or over 20%. The probability is that the allotment of production for the first year of the new compact will be materially increased, though prices may not vary much from what they are at present.

#### Idaho's Taxation on Capitalization.

With the incorporation of a multitude of new mining companies to operate in Idaho, the state law regarding taxation on capitalization has initiated some discussion, because it is not generally understood. For the information of our readers we would state that unless a mining company is producing it need not pay the annual license fee to the secretary of state.

The fact that the prospect is being developed to the productive stage, but is not yet producing, exempts the company from taxation. The annual license fee is payable in advance for the fiscal year, beginning July 1 of each year, and in case new companies are formed or enter the state during the fiscal year, the first year's fee shall be proportionate to such fraction of a year.

When the authorized capital stock does not exceed \$50,000 an annual license fee of \$10 is collected; \$25,000 to \$100,000, \$12.50; \$100,000 to \$250,000, \$15; \$250,000 to \$500,000, \$22.50; \$500,000 to \$1,000,000, \$37.50; \$1,000,000 to \$2,500,000, \$52.50; \$2,500,000 to \$5,000,000, \$75; \$5,000,000 to \$10,000,000, \$90; \$10,000,000 to \$20,000,000, \$130; over \$20,000,000 \$150 per annum.

The utilization of iron blast furnace slag is a matter of great economic importance, especially in the United States, Great Britain and Germany, the three largest pig iron producing countries in

the world. In America the United States Steel Corporation is manufacturing a good quality cement from furnace slag, and last year its output amounted to 2,129,700 hhls., the high record. A factor that suggests further expansion in the slag cement industry is cheapness of production; the expense is considerably less than for common Portland cement. Slag cement can be used to advantage in the construction of buildings, bridges, fortifications, railway embankments, etc. Experiments extending over 15 years show that the slag cement used for buildings in sea water have suffered comparatively little injury. The process of manufacturing slag cement is simple. The demand is certain to grow with the revival in construction work both here and abroad.

From all accounts it seems probable that the gold output of Alaska this year will show a material increase over 1907, when the total approximated \$18,251,610. An increase of say \$3,000,000 this year would put Alaska ahead of Colorado, the leading gold mining state in the Union. There is belief, however, founded on the active development of deposits upon which work was handicapped last year by labor troubles, or scarcity of water, that the increase in the gold output for Alaska will be more than \$5,000,000. Much the larger part of Alaska's gold has come from the placers of Nome and Fairbanks and from the lode mines in the Juneau district on Douglas island. The discovery of a rich, new beach near Fort Davis, is expected to contribute generously to the gold output of the Nome region this year.

Among those who will take part in the summer excursion of the Canadian Mining Institute beginning Aug. 24 are the following: James Barrowman, secretary Mining Institute of Scotland, Hamilton, Scotland; Hugh F. Marriott (representing Institution of Mining & Metallurgy), mining department, Messrs. Wernher, Beit & Co., London; William Frecheville, past president Institution of Mining & Metallurgy, London; John Ashworth, president Manchester Geological & Mining Society, Manchester, England; R. E. Commins, London; Sherard Cowper-Coles, Westminster, England; Dr. Heinrich Reis, Ithaca, N. Y.

The gold production of New South Wales for the first six months this year amounted to 131,255 fine ozs., valued at \$2,712,626.

# Property and Prospects of La Rose Mines, Cobalt.

By ALEX. GRAY.

The La Rose mine at Cobalt occupies the basin and one side of the trough of a syncline, uniformly seamed and consistently besilvered—more so, perhaps, than any other in that vicinity. If you take a wishbone, place it horizontally, regard the La Rose as the apex, the Nipissing on one side and Trethewey and Coniagas on the other as the "wishing wings," it might not be easy to make a choice. Suffice it that La Rose's portion of the bowl is more valuable because it was completely cracked laterally and transversely, permitting of chemical emanations and infiltrations and resultant riches.

With the assurance that La Rose has twin concentrations in its Lower Huronian conglomerates, and that it has no contacts of injurious aspects to worry about for a year or two at least, the opportunity to analyze the four years' operations has been seized. It is solacing to project calculations as to what La Rose

*Geology and development of property. Ore shipments and recovery of silver, cobalt, nickel and arsenic during past four years.*

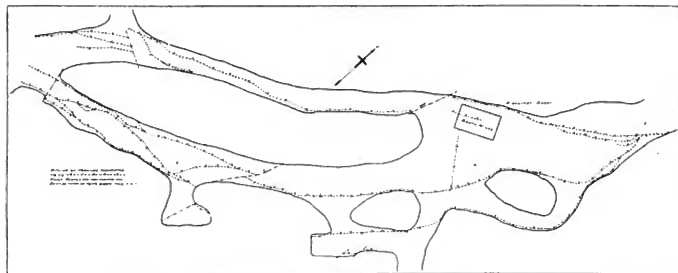
*Analysis of engineers' reports on mines comprising consolidation. Ore reserves, and prospective profits.*

wall rocks, depositing precious and useful metals in exceptional degree.

The La Rose ground seems to have escaped without injury other than what made for excess of mineralization, and were it not that there are inexorable stratigraphical defects at depth easily projected, each leap year for another decade might supply these magical summaries: Ore production, June 1, 1904-1908 5,581

Silver output (1907) ozs.....	185,925,000
World's .....	56,325,000
United States .....	9,914,955
Cobalt's .....	12,118,000
La Rose's percentage of Cobalt's total .....	18.94

What there is in the La Rose beyond the metaphorical "point of the pick," those who deal in certainties are chary about. Prof. Miller, Prof. Brock, R. B. Watson and T. R. Drummond have each been very thorough in their sampling, and scrupulously circumspect in their calculations. Mr. Watson in behalf of W. B. Thompson and E. P. Earle conducted an examination of the mine extending over two months, and his extreme conservatism negatives local surmises as to the purposes of the promoters of La Rose Cons. Mines. The report made by Messrs. Watson & Watson should serve as a standard in Cobalt transactions hereafter. Every element relevant to the mine, its products and prospects, was dealt with dispassion-



Plan of Portion of Workings on No. 1 Level.

shareholders ought to receive if the silver-soldered basin has values approximating those of record since July, 1904. Should those values, or anything approaching them, prevail to 300 to 350 ft. vertically and 1,000 to 2,000 ft. laterally in a minority of the La Rose cracks, the bowl will be a piece of mining bric-a-brac, the story of which may have its sequel in the further 36 acres to the north—the La Rose Extension—awaiting exploitation. On the other hand, it would be very unpleasant to conjure what would happen if hypothesis went wrong and estimates of silver, cobalt, nickel and arsenical contents did not come right in these 73 acres.

Those who value the La Rose 37 acres at their worth are apt to undervalue the La Rose Extension 36 acres. They are incredulous that this company should, by fortuitous slatings, have pre-empted local enrichments, along lines of fissuring in the conglomerate without variations in strata, where thermal and atmospheric solutions percolated crevices and receptive

tons; silver production, June 1, 1904-1908, 2,675,101 ozs.

	Gross.	Net.
Value silver produced of 1.461 days .....	\$1,711,422.09	\$1,504,767.00
Value silver produced per day....	1,171.40	1,029.91
Value silver produced per hour.....	48.80	42.91
Average silver value, 1st class ore per ton at 55c per oz.....		1,174.00
Average silver value 2d class ore per ton at 55c per oz.....		73.80

The La Rose is one of those fables based on fact, with metallics to puzzle prosaic engineers bent upon sampling; fancy rock urging the exercise of speculative optimism in reckless degree. Another way of distinguishing it, and singling it out as a thing apart from the ordinary silver mine suggests itself below:

ately, so much so that there is ample allowance for "hungry" sections, minor faults and occasional lapses, incident to such occurrences. These figures on ore practically developed, as given by R. B. Watson, now consulting engineer to La Rose Cons., and T. R. Drummond, former manager of the Nipissing Mines, emphasize the conservatism of the former and the difficulties attending sampling.

Obviously there is an error in estimates of the McDonald vein tonnage where the values tally so closely, but it is refreshing to have technical men in harmony as to possibilities divergent in their premises. Mr. Drummond adverts to the series of cross veins, chief of which is No. 3, from which over a million ounces of silver have been mined from surface trenches. On the surface this vein, though thinner than the main vein, is uni-

	1904.	1905.	1906.	1907.	Gross.
La Rose output, tons.....	90.05	697.86	814.61	7,815.15	4,661.97
Cobalt's output, tons.....	191.55	2,336.41	5,836.59	14,857.24	25,215.49

formly rich, a polished section of the outcrop still intact being one of the curiosities of the camp, comparable with that of the Lawson, which is destined to become a part of La Rose Mines assets. On the O'Brien mine adjoining, No. 3 is the source of supply of high-grade rock throughout a known distance exceeding that of any other vein Cobalt has yet disclosed. Mr. Drummond, therefore, considers himself below the mark when he states that another 1,000,000 ozs. of silver will be extracted from the La Rose section of No. 3. This allows a margin for underestimation, because "closer examination might greatly increase these figures," in Mr. Drummond's opinion. Exclusive of veins Nos. 9, 10 and 11 in inadequately prospected territory at the north end, Mr. Drummond lumps No. 5, the McDonald and other veins among the *et ceteras* in the equally unknown southeastern area, and estimates for them an output of 430,000 ozs. On the other hand, Mr. Watson confines his estimates of "indicated ore" to:

Main Vein—	Tons.	Ounces.	Value at 50c per oz.	Estimated Profit.
Drummond .....	4,957	3,673,000	\$2,020,150	\$1,770,150
Watson .....	4,045	2,903,310	1,596,820	1,152,893
No. 3 Vein—				
Drummond .....	298	1,100,000	605,000	590,000
Watson .....	225	660,226	363,125	322,398
McDonald Vein, Etc.				
Drummond .....	229	520,000	291,500	278,800
Watson .....	2,778	632,000	318,150	260,421
McDonald vein	Tons.	Ozs.	Value at 50c per oz.	Estimated Profit.
No. 3 vein .....	3,292	615,529	\$338,541	\$240,961
	16	82,000	45,100	41,500
	3,308	397,529	\$383,641	\$282,466

It is explained by Mr. Watson that only the main, McDonald and No. 3 veins are developed. The main vein, extending into

section of the Nipissing, which promises to greatly augment the output of that company, there is scope for extensive exploration. The main vein travels through the basin of the historic syncline, the swampy nature of which makes prospecting at surface inconvenient. It is the intention to crosscut this section parallel to the main vein from an intersection with No. 3, northeast to the La Rose Extension, and thereby create a working area dealing with the northwest, southeast and east-west low lying series. On the high ground, Edge Hill, a tunnel is being driven on the McDonald vein. Another "great cut" designed to cross-section that country is already under way. Casual prospecting here at surface, and in the face of the hill, has recorded eight veins, of which the No. 3 and McDonald have been exploited. Nos. 4 and 5 show high values at surface. No. 7 has been traced 500 ft. and contains argentic characteristic of portions of the O'Brien. However, no immediate importance has been attached to these, excepting the McDonald and No. 3, in estimates as to ore reserves or indicated ore, and Mr. Drummond touched upon the policy adopted by Mr. Watson when in his report to La Rose Mines, Ltd., he said:

"Practically no crosscutting has been done. It seems highly probable that systematic crosscutting will develop more ore, as it is very unlikely that a series of veins in proximity to one another, but only parallel over a long distance, could be entirely developed by one drift. Ex-

ploratory work done with a view to cross-cutting the southeast and northwest system of veins would in all probability be well rewarded. No exploration has been done in the northwest portion of the claim



La Rose Vein No. 3. Open Cut.

(across the railway), which should be valuable ground. The La Rose Extension claim consists of 35.86 acres of ground located on the direct extension of the La Rose vein towards the northeast. Judging from the small rock exposures, the formation is favorable for ore deposits, and I consider that there is no better piece of unprospected ground in the Cobalt district. Practically no development work has been done on this claim to date."

Had Mr. Drummond chosen to deal with the geology and contour lines of the La Rose and La Rose Extension, he could have made a stronger case, because there is every indication of an undisturbed working area to the north, reckoning from the outcrops of the Kewatin at the Hudson Bay and O'Brien properties at the widely apart extremities of the syncline. There are no evidences of denudation in the basin, and there is some proof of second enrichment in Edge Hill. A year ago Prof. Miller referred to this contingency in the La Rose, and the seeming certainties. Like the La Rose the La Rose Extension is entering in the Huronian country, the only departures being near the Right of Way, where there is a patch of diabase, and at the bottom of the main shaft, where intrusive shales have faulted the vein. Prof. Miller pinned his faith to the continuance of the main vein from the Right of Way to the La Rose Extension, which it should enter, if not diverted, about 40 ft. west of the prospecting shaft sunk on the claim.

What the La Rose has been doing during some of its four years may be illustrated by the verdict in the suit against it instituted by the Right of Way Co. The court held, upon the evidence of J. B.



Lawson Vein. Richest Outcrop in Camp.

the Right of Way property, has a proved integrity throughout 1,200 ft., and there is every reason to suppose it will be fol-

Tyrrrell, A. A. Cole, and Prof. Brock that the La Rose people had been extracting Right of Way rock. The damages were assessed at \$167,000, and this represented 1,579 tons taken from a drift 115 ft. long and about 20 ft. of stoping. Prof. Miller in his inspection had the co-operation of Prof. Brock. They valued the mine in August, a year ago, as follows:

Ore Blocked Out on Two Sides—		Tons.
Main vein above 1st level.....	3,728	
Main vein below 1st level.....	2,228	
Total.....	5,956	
No. 3 and other cross veins.....	552	
Representing in Silver—	Ozs.	
Main vein, 1,100 ozs. per ton, 1st level.....	1,100,000	
Main vein 765 ozs. per ton below 1st level.....	1,712,070	
No. 3 vein, 4,000 ozs. per ton.....	2,208,000	
Total.....	8,920,870	

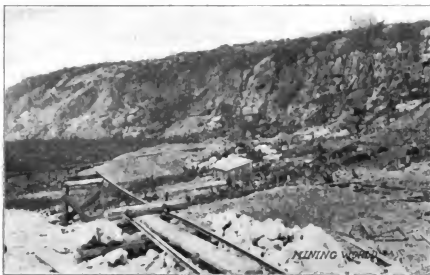
Nor were Messrs. Miller and Brock content to have these figures without optimistic qualification. They held that if the ore above the first level contained 1,500 ozs. to the ton, another 1,591,000 ozs. would have to be added to their grand total, together with the contents of 240 ft. that had been "faulted out in the walls" and since located back of the discovery shaft. Besides the 1,591,200 ozs., and the 1,780,000 ozs. allocated to the 240 ft., the provincial geologists allowed for a conjectural 200 ft. or more on the northern extension of the first level—another 1,479,680 ozs., or a total in ore blocked out of 8,020,870 ozs., together with possible ore containing 3,259,680 ozs.

Taken in connection with these calculations by gentlemen whose figures in one spot were verified in the Right-of-Way ground in dispute, no doubt later estimates will commend themselves to Messrs. Thompson and Earle. Prof. Miller and Brock were careful to note that the value of the Main vein "or system of veins exposed in the level shaft and winzes cannot be determined by the amount and value of the ore in sight." They reservedly noted that "while the work done has shown it to be a very valuable property, capable of producing a large amount of valuable ore, it has not been of such a nature as to develop the largest possible amount of ore in sight." What is especially pertinent to the sketch appearing elsewhere in this issue, these gentlemen also remarked that "the first level happens to be cut by a number of nearly horizontal slips which disturb the vein system and prevent a wholly satisfactory examination of it."

The plan herewith, showing portions of workings on No. 1 level of the La Rose mine, main vein, kindly supplied by R. B. Watson, consulting engineer to the La Rose Mines, Ltd., amplifies the difficulties experienced by Messrs. Miller, Prock and Corkill, Messrs. Tyrrrell and Cole, Mr. Bruce Marriott and Mr. Watson, while sampling the ore bodies and estimating their metallic values. Prof. Miller's party sampled every foot of what was exposed in August, 1907. Despite minor faultings and occasional shattering responsible for the conditions illustrated in the section as reproduced, the integrity of the vein throughout is best attested by subsequently repeated samplings approximating Prof. Miller's figures. It

will be readily understood, as Mr. Watson has explained, that mining engineers have to make check assays on themselves, where such geological and mineralogical vagaries are in evidence, and sound mining practice is demanded in order to pick up the silvered threads in wall rocks. Local freaks and fractures of this sort throughout Cobalt, add zest to the mastery of science inseparable from the extraction and treatment of these ores. Prof. Miller was the first to specially dwell upon the spreadings in the greywacke and conglomerate where a vein may occupy a distinct fissure-like opening for some distance, then split up into stringers, travel around columns out of the previous course of the vein, and swing back again into the normal line of strike some distance ahead. Under these circumstances the original sampling of the La Rose by Prof. Miller was a feat of special merit in that the quantity of metallics and multiplicity of stringers here

pinched or faulted to one side, the latter being the more reasonable deduction. About 90 ft. from the face of the north-east drift on this level it is apparent to Mr. Watson that the workings are off the vein, and it is near there that a winze to an intermediate level is developing a 4-in. vein of 3,000 ozs. silver ore, besides two veins of almost solid niccolite, which is being sorted from the other rock, sacked and saved. The 157-ft. level most likely is on the same series as the first level, notwithstanding structural and mineralogical variations in places. Towards the north end of this lower level development on the east of the 62-ft. level has not solved some of the problems confronting the management. Mr. Drummond holds that the general system of faulting in the mine, wherever observed, indicates that the veins lie toward the west, but this is mere conjecture. Certainly the slates and slips in the 65-ft. drift at the 210-ft. or bottom level come in from the



Edge Hill—La Rose Property.

and there in the dislocated sections required maximum caution. Mr. Bruce Marriott of London and a half-dozen helpers devoted two months to the sampling, which he contemplated doing with the aid of one assistant in a week. Mr. Watson made 1,200 assays, taking samples every two feet in his examination of the mine for W. B. Thompson and E. P. Earle. Generally speaking, his conclusions tallied with his predecessors' as to developed and calculated ore; and the thoroughness of the inquiries may be regarded as correctly indicating the constructive purpose of principals in interest.

The north end of the first level of the La Rose is about 250 ft. from the south line of the La Rose Extension. This level is at 62 ft. from the collar driven almost continuously on ore for 900 ft. in La Rose ground alone. For 300 ft. south of the main shaft the combined thickness of the veins will probably average 15 in., assaying close to 1,000 ozs. of silver per ton. North of the shaft, and not allowing for curvings, the vein has been exposed for 501 ft., of which 441 ft. is in good ore in parallel seams, while in the remaining 150 ft. the veins are

west, where more crosscutting will now be done. In the 157-ft. level special conglomerate slate stringers have been encountered with high-grade ore similar to that being opened out by the north winze at the intermediate level; all of which justifies expectations of equally good values at the second level in that locality. These vagaries make mining thereabout the work of real mining men and not of market mechanicians. Undoubtedly Mr. Watson and his staff have the mine and its peculiarities well in hand. No. 10 and the McDonald veins, in combination with No. 3 and the Main vein, give Mr. Watson the benefit of all doubts when he advised W. B. Thompson and Mr. Earle to exercise their option.

At present public interest, while affected by figures on authority, centers on the end of the drift "at the north end of the first level where these gentlemen and their contemporaries are agreed that the vein is "strong and rich," compensating for a low grade and defective section at the south end. Where the vein system is well exposed by a spacious drift or in deflected drifts, following offshoots from the main vein and paralleling it, an aver-





# The Petroleum and Manjak Industry of Barbados.

By EDMUND OTIS HOVEY.

Geologist.

Oil has been obtained in a desolatory way from the island of Barbados for many years. It is found floating upon springs and along streams in the valley below Spring Vale, at Springfield and elsewhere, and is so thick and heavy that it is known locally as "tar". A valley on the Springfield estate which reaches the sea at the 21-mile post on the narrow-gauge railway running from Bridgetown to St. Andrews contains the wells from which came the original "Barbados tar", which was used as a lubricant and as a constituent of certain patent medicines. From the mile post five primitive baling derricks are in view in a line running about S. 70° W., but only the well nearest the railroad showed, at the time of my visit, (June, 1908), signs of recent use. The well is shallow and baling is done by means of a sand pump through a 6-in. pipe.

The general surface rock of Barbados is a white coral limestone of late Tertiary age, but the foundation of the island is a series of more or less highly tilted, folded and faulted sandstones and sandy clays and claycocks. These are exposed in the northwestern part of the island over an area constituting about one-seventh of the whole, and are called the "Scotland" beds from the local name of the district in which they attain their best development. They have been fully described by Harrison and Jukes-Brown in their discussion of the geology of the island and by later writers. The Scotland sandstones are of Eocene or Cretaceous age and consist of loosely cemented white quartz lit rounded and subangular grains and show an occasional layer of pebbles or of ripple-marked clayey sand firmly cemented by iron oxide. The sandy clays are dark brown or purplish gray with many bands 1 to 18 ins. thick or purplish micaceous sandstone. The more clayey layers contain abundant concretions, or clay-balls, and nodules of clay-iron-stone. These strata have been greatly affected by movements of the earth's crust and have been tilted and folded so that now they stand at high angles to the horizon and show faulting at several places.

Lying unconformably upon the Scotland beds is a series of oil-bearing sands and arenaceous clays, which according to Professor J. B. Harrison may have a thickness of as much as 700 ft. The same author reports the finding of a few Oligocene fossils in the beds and refers the deposits to the same age as that of the Eocene strata near San Fernando, Trinidad. The upper portion of the petroleumiferous beds is highly argillaceous. The whole series occurs in broad folds, the axes of which run in a general east-west direction. The oil-bearing sands have heretofore usually been included in the Scotland series, but it seems evident that they should be separated therefrom.

*Oil of the Island of Barbados is thick and heavy, known locally as "tar." Operations of a desolatory nature. From here came the original "Barbados tar," used as a lubricant and a patent medicine constituent.*

*Intimate relation between the petroleum and the "manjak" of Barbados, the latter being derived directly from the former.*

Near Triopah, a short distance from Spring Vale, in St. Andrews Parish, a good section of the oil-bearing sands is shown along a brook. Massive beds of sandrock 30 to 40 ft. thick are exposed with the tarry oil oozing from their lower portions, and it is stated that these surface sands run 12% to 14% petroleum. In this Triopah district three wells have been sunk 48 to 60 ft. deep. One has become choked, but the others furnish from 40 to 120 gals. of oil per week according to the regularity of baling and the season, rainy weather increasing the flow of oil. The oil is used as a lubricant and as a cement upon the streets along the tramcar rails. The crude oil brings 12 cents per gal. at the well.

Some years ago a company was formed in England for the exploitation of the oil of Barbados and a well about 800 ft. deep was put down in the Dark Hole district near Chalky mountain. This boring struck heavy oil which actually came to the surface in pulsations at intervals of about half a minute, but for some reason the company has not made use of the well. The enterprise languished and after at least two re-organizations, the company began sinking wells in the Turner's Hall district. The first well was put down close to the locally famous "Boiling Spring", which was not a thermal, but really a mud spring, emitting so much hydrogen sulphide that the gas could be collected and burned. Several wells have been put down in this region, but exact statistics regarding them cannot be obtained by the public. Most of the wells are 700 to 900 ft. deep, but some are said to be 1,100 to 1,300. All are said to have struck oil or gas, but no flowing well has been found and none has yielded any great quantity of oil by pumping.

The company went so far as to build storage tanks, a pipe line to the leeward (west) coast of the island and a small refinery. The refinery was run for only a short time, although the operating company published a statement five years ago that its annual output was 150,000 gals., which it would undertake to increase to 200,000 if the government would grant them a monopoly of oil shipments from the island. The government declined to grant the monopoly, and the company is doing no work beyond baling and keeping

the present wells open while awaiting government action upon its application for a new concession.

It is stated that five grades of oil have been found on Barbados, all of which are of asphaltic base. The subdivision of the oil into grades apparently rests upon differences in appearances. Only one analysis, made in 1898, has come to hand, and other data regarding the well from which the oil came seem to have been lost. The analysis follows:

Fractional distillation. Spirit (below 150° C.) .....	3.5%
Illuminating oil (150-300° C.) .....	12.5
Lubricating oil (above 300° C.) .....	54.0
Bitumen (and traces of ash) .....	28.0
	100.0

The Barbados local legislature, following the lead of Trinidad, passed an act in 1901 giving the British Admiralty the right of pre-emption on all oil produced in the island, the value of the oil to be fixed by arbitration if necessary, and the right to be exercised after due notice given by the Admiralty. The act also provides that operating companies may deal directly with the government for concessions, instead of applying to individual land owners for permission to bore. This provision tends to expedite business, since land in Barbados is owned in such small parcels, that the expense and delay incident to gaining endless consents is almost prohibitive of prospecting, since landowners own the mineral as well as the agricultural rights in the land. The government, however, acts only as intermediary with reference to contracts and all rents and royalties are paid direct to the land owners. At present intending prospectors apply to the government for "provisional orders" stating terms offered. These vary so much that strong pressure is being brought to bear upon the government for the framing of a model order to which all provisional orders shall conform stating area of grant allowed, amount of royalty to be paid, duration of option or lease and other particulars.

The relation between the petroleum and the "manjak" of Barbados is intimate, in fact it is definitely known that the latter has been derived directly from the former through loss of volatiles. At the Vale mine in the Dark Hole district a shaft has been sunk in which R. H. Emage, the owner and operator of the Spring Vale and other mines, has observed the "manjak" between 80 and 120 ft. from the surface passing from its usual form above into a tarry oil below which is indistinguishable in superficial appearance at least from that obtained in the oil wells and springs. The substance is a rather hard, brittle, brilliant black bitumen giving a black powder. It is highly soluble in carbon disulphide, turpentine and chloroform, moderately soluble in ether. In some deposits or pockets the manjak becomes more silicious in appearance, contains a little quartz sand and is dull as to

<sup>1</sup>The Geology of Barbados. By J. B. Harrison and A. A. Jukes-Browne. With geological map. Barbados, 1899.  
<sup>2</sup>Geological Formation of Barbados. By J. B. Harrison. Director of Science and Agriculture, British Guiana. Barbados, 1908.

lister. It is well known as the basis of one of the best varnishes obtainable for coach, carriage and other woodwork where a deep, permanent black is desired.

Manjak has been known in Barbados for a long time, certainly for more than 60 and probably for more than 100 years, but even as lately as 1890 the material was not thought to be of particular commercial value, and Harrison and Jukes-Browne pass the substance by with slight comment, since they felt that it would never be developed, because it could not compete with the asphalt of Trinidad. Fortunately for Barbados, manjak serves purposes for which Trinidad and other asphalt is not suited, hence several thousand tons of the substance have been mined and exported during the past 13 years, and Mr. Entage is still actively engaged mining it at Spring Vale, producing about 500 short tons per year, which is all that the market calls for at present.

Manjak was first mined and exploited commercially by the late Walter Merivale, M. I. C. E., in 1895 on the College Estate at the eastern end of the island. In the best days of the industry this manjak, which is considered better than the Spring Vale material, brought \$120 per short ton in New York. The College vein was mined down to 400 ft. below the surface. The vein was always pocketry in character, but, though small, had not been lost when the mine was abandoned.

The manjak occurs in the sandy clay bed, forming the upper part of the oil bearing series. It forms veins cutting obliquely and perpendicularly across the strata. In the Spring Vale mine the principal vein is from 6 to 10 ins. across and has been followed to a depth of 200 ft. from the surface, where it still preserves its strength and quality. The value of the mine, however, lies chiefly in the pockets which the vein develops from time to time. These are of varying dimensions and the largest yet found is now being exploited. It was cut into at the 220 level, but its extent has not yet been fully proved, though about 270 tons of pure manjak have been taken out of it. It is known to be more than 27 ft. across and 10 ft. thick. In the upper part of the mine the main vein dips at an angle of about 45° southward, but this dip increases to about 85° in the lower levels according to Mr. Entage. In addition to the occurrence in these veins and pockets the manjak is disseminated through the clays in disconnected flakes and angular particles. Several promising prospect holes have been opened near the Spring Vale mine.

When first opened a pocket of manjak often gives off gas, but this is removed by using hand blowers to improve the ventilation at the face of the working. Otherwise the air in the mine is not bad and reliance for ventilation is placed upon an old shaft which is connected with the present workings. Safety lamps are used, however, throughout the mine. As would be expected from its clayey nature, the ground is bad and much difficulty is experienced in the tunnels from pressure and crushing. The question of timbering is a serious one, since all the timber must be imported. That used in this mine comes from Demerara. The more or less

permanent galleries are supported by means of iron T-rails bent into proper shape. Fortunately the mine is dry or it could scarcely be worked at all.

Work in the mine is not hard, there being no drilling or blasting and all excavation being done by pick and shovel. The manjak is brought out in sacks and transported by donkey teams to storehouses at Warrens, where it is sorted and freed from any clay and then packed in sacks for shipment to New York or in barrels for Europe. The Spring Vale manjak brings at the mine about \$30 for grade "E" intended for New York and \$55 for grade "A" intended for Europe. Analyses of grade "E" was made by Professor J. P. d'Albuquerque of Barbados; that of grade "A" by Mr. Entage himself.

	E.	A.
Moisture .....	2.49	
Asph. ....	2.70	1.15
Carbon .....	83.62	88.60
Hydrogen .....	8.29	
Sulphur .....	0.85	
Oxygen and nitrogen.....	2.05	
	100.00	

The workmen in the manjak mines at Spring Vale get what are considered high wages in Barbados but would not be very attractive to American miners. Eight men and six boys are employed underground. The boys get from 20 to 25 cts. per day in nine hours, six days in the week, while the men get from 35 to 45 cts. per day on contract or "task" work, and 40 cts. per day when on a daily wage basis. On the surface there is an engineer at \$3 per week, a carpenter at \$2.16 per week, a blacksmith at 40 cts. a day and a trolley man at the head of the shaft at 24 cts. a day. These wages are to be compared with those of the average hand in the sugar cane fields, who is glad to get 20 cts. a day.

According to Mr. Entage, from whom also the statistics published in Mineral Resources of the United States for 1905, page 1168, were obtained, the annual production of manjak in Barbados for the last seven years has been as follows in short tons: 1901, 1,168; 1902, 1,033; 1903, 728; 1904, 707; 1905, 725; 1906, 500, and 1907, 500. The figures for the last two years are estimates rather than exact statements. The great development in the production of gilsonite in the United States during the past two or three years has caused marked falling off in the demand for manjak, although the latter material is better adapted to the manufacture of certain varnishes than is the former.

The orange color of uranium in glazes is produced by the pressure of lead, and the depth of color is proportional to the amount of lead. "Yellow uranium oxide" (sodium uranate) gives the clearest color, is cheaper than the "orange," and less than half the cost of the "black."

Advices from Puebla, Mex., state that for Mexican National Exposition to be held there in the spring of 1910 the San Juan ranch has been ceded to the board of management. Fencing the grounds and other initial work has been started. Gomez Haro is secretary.

## Mining in Shantung, China.

BY WILHELM F. GRACKY.\*

The province of Shantung has valuable mineral resources, of which only a few surface deposits have been utilized by the Chinese.

The further development of the mica beds near Tschou-chong has been retarded. It appears probable that the mica beds continue on a larger scale below the surface, and the products which have been prepared at the mines and offered for sale in Germany have been bought up at good prices.

It is stated that copper has also been found, as well as gypsum, and that large quantities of clay exist which is being made into bricks and tiles, and that sandstone and building stone occur in great abundance.

Near the railway station of Tsing-tscheng there is an iron ore deposit on the Tschian (Iron mountain) of no small proportions, the commercial utility of which has been determined by investigation and by scientific prospecting during recent years. Analyses have shown that the deposit consists of magnetite and hematite, which contains up to 65% of iron. This result has been confirmed by further inspection of samples taken from drillings, drifts, and shafts of the prospecting works of the German Mining Society. The deposit is said to be about 2 km. (1,242 miles) long, 35 meters (38 yds.) deep. There is sufficient ore in sight to warrant work on a large scale.

Further investigation has proved that a vein exists at Sy-hau mountain, where prospecting has been carried on, near the railway station of Tschangtien.

Considering the high percentage of iron, the other elements not being of a nature to make reduction difficult, and the fact that a plentiful supply of limestone is near at hand, it appears as if the prospects for operating this field were favorable. This work would meet a growing demand among the agricultural population of the district, who at present secure their needed supply of iron by importing scrap iron and old horse-shoes from abroad, and pig iron from the province of Shansi.

The Shantung Mining Co. has under consideration the construction of reduction works, and it is understood that the matter will be taken up as soon as the development of the company's Poshan coal mines guarantee a sufficient supply of coke.

Owing to the fact that the province is the most densely populated in China, having an area of 55,084 square miles and 38,247,900 inhabitants, or 683 to the square mile, labor is available at a low cost, although the tendency appears to be to charge higher prices for working in German mines than is expected in the Chinese mines, and for other work in the province.

The survey of the Chining-Changchun line, which is to be built jointly by Chinese and Japanese, has been completed. The cost of the line is estimated at 9,000,000 taels (\$2,300,000).

\*American consul at Tsching-tscheng, China.

# Progress in Use of Suction Gas Producer Power.

By L. P. TOLMAN.

Introduced into the United States about five years ago, the suction gas producer for developing power from coal and lignite has become a commercial reality and is fast gaining approval among engineers and power users.

The history of producer gas dates as far back as 1569, when the "Eulen Heizen" first became known, and were described by H. Brunschwyk in his book, "Ars Distillandi de Compositis," or the "Art of Distilling Compounds," which was published in Strassburg, Germany.

The first plant similar to those now in use was built by Emerson Dowson, who has the distinction of introducing in England, in 1878, the first practical gas producer for power. This producer was of the "pressure" type. A small steam boiler was necessary, as well as a large gas

*American gas producers for American coals and lignites. Development and types of the suction gas producer. Over 500 plants, with capacity of 150,000 hp., installed in the United States.*

*Efficiency and economy of producer gas power plants. Calorific value and composition of different fuels.*

1 shows a complete producer gas power plant with engine direct connected to electric generator.

About five years ago American manufacturers began to take a lively interest

in 10,000 suction gas power plants in Germany alone. They had come into general use and were found in the finest hotels, stores, factories, etc., for electric lighting and other power purposes. The actual users of the plants were enthusiastic over the results.

That producer gas power is a pronounced success in the United States is evidenced by the large number of satisfactory installations already in operation on American coals. It is estimated that there are over 500 producer power plants in this country, having an aggregate of 150,000 hp. Of these, about 85% are of the "suction" type and 15% of the "pressure" type. The suction plants average approximately 100 hp. each, while pressure plants are usually built in sizes larger than 1,000 hp.

This article deals with suction gas power plants in single units of 200 hp. or smaller, and complete plants made up of a number of such units 1,000 hp. or larger. This range of sizes covers the requirements of the great majority of power users.

## PRODUCER GAS POWER FOR MINING.

A number of producer plants have been installed for this service and with excellent results. Fig. 8 illustrates a 30 hp. Fairbanks-Morse producer gas hoisting plant in use in Mexico. At this plant Pennsylvania anthracite costs \$14 (gold) per ton, but even at this price the cost of fuel when running full load amounts to only 30 cents per hour.

At places difficult of access the use of steam power becomes almost prohibitive, owing to the excessive cost of transporting coal. Where the steam plant uses 6 or 8 lbs. of coal, the producer plant uses 1 to 1½ lbs. The cost of hauling coal to the mine is usually about one-sixth what it would be with a steam plant.

Where water is scarce or has injurious effects on the boilers, a Fairbanks-Morse producer gas engine avoids the trouble and expense of operating a steam plant. While water is required both for the water jackets of the engine as well as for



Fig. 1. A Complete Producer Gas Power Plant.

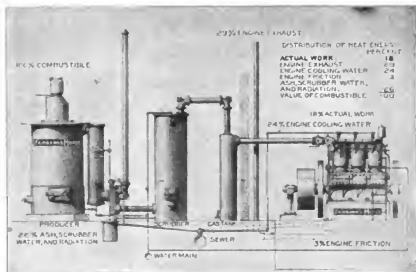
holder Mr. Dowson's plants were successful and are still in regular service. Anthracite is the usual fuel.

The next substantial progressive step was taken when Dr. Ludwig Mond, in England, in 1889, developed the first successful soft coal producer. This became a standard for sizes of 250 hp. and larger, but proved too elaborate and expensive for use in smaller sizes. With this plant a large gas holder is needed, also a steam boiler and an elaborate system of gas washers, purifiers and economizers.

Then followed the invention of C. Wiegand, of Hanover, Germany, who in 1895 took out the first patent (No. 88044, German) on the principle of the modern suction gas producer. The importance of this invention was not realized in Germany until some years later.

In France, during the same year, Benier built what is believed to be the first practical suction gas producer. This was a success as soon as the necessary changes had been made in the gas engine to adapt it to the "suction" system. It is surprising in this case, as with most other great inventions now in general use, that an apparatus so simple and easily understood was not developed long before. Fig

in the success of European, and especially German, suction gas power plants. American engineers visited Europe, and in this way learned at first hand what was being done abroad. As early as 1904 it is estimated that there were over



Power Plant.

the coke scrubber for the producer plant, yet by means of a cooling tower and storage basin it is possible to use the same water over and over again. In this way only a small amount is evaporated.

Mines which are operated electrically, either for lighting or for power, will find this form of power equipment in every way adapted for the service. A complete installation of this kind is illustrated in Fig. 1, this showing Fairbanks-Morse type "R" vertical engine direct connected to Fairbanks-Morse electric generator, the engine being supplied with gas generated in a Fairbanks-Morse suction gas producer. This view shows the engine room separated from the producer room by means of a partition, which is advisable in order to protect the engine room equipment from dust. In the producer room is shown small gasoline engine used for driving the air compressor and blower, which apparatus is used for starting only.

Fig. 2 illustrates a suction gas producer power plant. The apparatus is simple, reliable and economical. With this plant 18% of the total energy of the fuel is converted into useful work. (Varies according to conditions from 15 to 21½%.) This means that a suction gas producer plant uses from one-half to one-fourth as much coal for a given amount of power as a steam plant.

A 150 hp. suction producer plant, running two-thirds load, 3,100 hours per year, uses approximately 1¼ lbs. of coal per brake horsepower hour. (Tests have been made showing a consumption of less than 1¼ lbs. at two-thirds load and less than 1 lb. at full load.) With anthracite at \$5 per ton, the

fuel alone costs \$1,162.50 per year. Furthermore, the cost of attendance can be reduced materially with a producer plant, as the operator can spend part of his time in other useful work.

#### GOVERNMENT TESTS.

Much valuable information is given in the report of the United States Geologi-

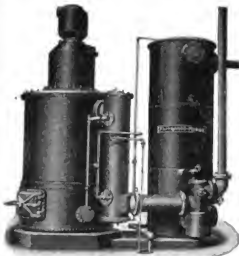


Fig. 3. Exterior View, Fairbanks-Morse Suction Gas Producer.

cal Survey concerning the fuel testing plant at the Louisiana Purchase Exposition, St. Louis, Mo. For three years the government experts conducted a series of tests on many samples of coal from mines all over the country. Briefly, the apparatus included a noncondensing Cor-

liss engine steam plant with water-tube boiler and a pressure type producer with 3-cylinder vertical gas engine.

From the summary of results obtained from a long series of tests, the fuel consumption in pressure type producer plant varied from 1.18 to 3.47 lbs. per brake horsepower hour, the average being approximately 1¼ lbs. The average with the Corliss steam plant was found to be approximately 4¼ lbs., using similar fuels. With lignite, the consumption in pressure producer plant was from 1.95 to 3.47 lbs., the average of five samples actually figuring 2.60 lbs. With Corliss steam plant using lignite, the average consumption of "coal as fired" (not "dry coal") was approximately 7 lbs.

While most of the above tests were on bituminous coals, which cannot be used advantageously in a suction producer, yet the consumption of anthracite in the latter is usually less than as stated for bituminous coal in "pressure" type producer, probably due to the fact that there is less resistance to the flow of the gas in the suction type. For example, tests on lignite in a suction producer commonly show a consumption of 2 to 2¼ lbs., whereas from the five lignite tests at St. Louis the average is 2.60 lbs. in a pressure producer plant.

#### ADVANTAGES OF SUCTION GAS PRODUCER POWER.

The most important and most practical commercial advantage is the economy effected in the cost of developing power. If there were no other advantages, this one feature would be sufficient reason for installing this system. Other advantages may be summed up briefly:

Simplicity: The producer, in which

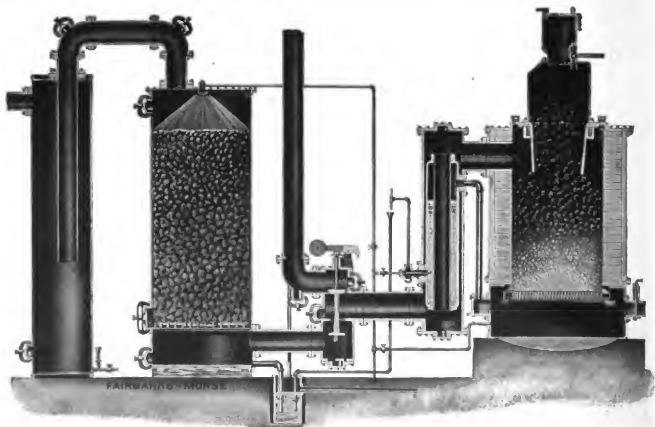


Fig. 4. Sectional View, Fairbanks-Morse Anthracite Suction Gas Producer.

fuel gas is generated from coal, is almost as simple as an ordinary furnace for heating purposes. The gas engine is entirely automatic in operation and needs

Stand-over loss: The stand-over loss with suction producer amounts to about one-third as much as with a steam boiler. In other words, where the stand-over loss

with a steam plant for 14 hours amounts to 600 to 800 lbs. or more, with a suction producer plant of the same horsepower, this loss would not exceed 200 lbs.

#### SUCTION GAS PRODUCERS.

Fig. 3 illustrates an exterior view and Fig. 4 a sectional view of a Fairbanks-Morse anthracite suction gas producer. All of the principal features are clearly shown. Coal is admitted to the producer through a hopper at the top. This has double closure, so that fuel can be introduced without at the same time admitting air. In the process of partial combustion which takes place producer gas is generated.

The hot gas passes through a vaporizer in which a small amount of steam is formed, which, with a limited amount of air, passes under the grate of the producer. In the smaller sizes, the vaporizer is at the top of the producer where it uses the waste heat from the escaping gas and where, at the same time, the water keeps the top from getting too hot. In the larger sizes the vaporizer is separate and connected to the producer by piping.

From the vaporizer, the hot gas flows through the scrubber, which is merely a cylindrical shaped tank filled with coke, over which a spray of water is constantly sprinkled. The large contact surface of the coke effectually cleanses the gas of

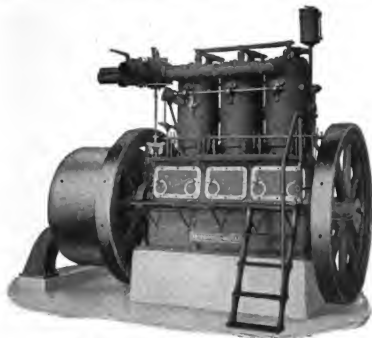


Fig. 5. Multi-Cylinder Vertical Producer Gas Engine.

little more than the ordinary cleaning and care as to lubrication.

Absolute safety: There is no danger from explosion or from fire. It is absolutely safe, even in the hands of men with little mechanical training, and the many plants which are in continuous operation, some of them 20 and even 24 hours a day, indicate that they are thoroughly reliable and will stand hard, every day usage.

Boiler insurance is unnecessary with producer plants, and the troubles and dangers encountered with steam boilers are entirely avoided. The complete gas engine and suction producer plant is almost entirely automatic in operation, very little attention being required. Ordinarily the operator only needs to spend 10 to 15 minutes about every two hours to dump a few buckets of coal into the producer and give general attention to the plant. He can spend part of his time in other useful work, and an extra man as fireman is not required, even with plants of from 400 to 500 hp.

No smoke stacks and no smoke: Hundreds of thousands of dollars which are now spent annually in building smoke stacks can be saved; and, what is of greater importance, the smoke nuisance can be entirely abated.

Less coal to be handled and stored: Where the suction gas producer plant uses  $1\frac{1}{4}$  or  $1\frac{1}{2}$  lbs. of coal, the steam plant commonly requires 4 to 6 lbs. or more. Moreover, with the producer plant there are fewer ashes to be handled and disposed of.

Starting: The producer will hold fire all night or even for several days, and the proper quality of gas can be generated after 15 or 20 minutes' blowing to revive the fire. The engine can easily be started on compressed air, and after getting up speed it is then operated on producer gas.

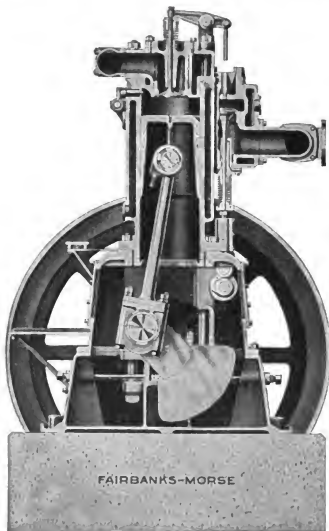


Fig. 6. Sectional View of Multi-Cylinder Vertical Producer Gas Engine.



dust and impurities carried over from the producer, and also acts to cool the gas, which is essential in order to prepare it for use in the engine.

With certain fuels, especially when much tar is encountered, it is also necessary to add a sawdust purifier in order to abstract the last traces of tar from the gas. While not absolutely essential, yet it is always advisable to use a gas tank between the scrubber and the engine, in which a certain amount of gas is stored in ready use for the engine. This is especially desirable where the loads are variable.

In the care of the producer, the principal attention needed is to poke the fire

it makes an excellent fuel for the producer and in some respects is easier to handle than anthracite.

Coke and charcoal are economical fuels in some sections, and can be used separately or mixed with anthracite.

In order to give some idea of the relative value of different producer fuels, the results of tests on a number of samples are given. These samples were received from various parts of the United States, as well as from foreign countries. For example, in table 1, giving the analyses of different anthracites, sample 65 is from Europe, 101 and 76 from Pennsylvania, 71 from Elk Mountain, Colo., and 89 from Banff, British Columbia. The following

clinkers down through top poke holes. It is an advantage in using poor anthracite to have large producers.

This fuel varies in quality according to the soft coal used in its manufacture and the method of treatment. All coke must be crushed to pass a screen of 1 or 14-in. mesh, and must be freed from dust with a fine screen. It is usually advisable, where coke is used, to install one size larger producer than is the standard. A sawdust purifier is also desirable to remove dust, which is more abundant than with anthracite.

Gas from coke averages about 115 British thermal units per cubic foot (lower heating value), while from anthracite it averages 125 or more. For this reason the power capacity of the engine will be a little less on coke gas, but not as much less in proportion as the heating value. Some coke will not maintain the fire hot enough. Mixing one part anthracite with two of coke usually corrects this.

Charcoal, British thermal units per pound, 14,388; fixed carbon, 81.3; volatile, 12.9; ash, 1.1. The use of this fuel becomes practical by the addition of a centrifugal tar extractor located between the scrubber and a sawdust purifier. With this fuel also it is advisable to install one size larger producer than with anthracite.

Charcoal gas has a heating value averaging 130 British thermal units or more, and because of this gives somewhat more power at the engine. It can be used in as large pieces as will readily go through the producer charging hopper. Less tar results from charcoal that is perfectly charred, but more or less material not perfectly charred is likely to be found. No clinkers are formed with this fuel.

Lignite cannot be used in standard anthracite producers, but the Fairbanks-Morse lignite producer operates successfully with this fuel. Gas from lignite averages 130 British thermal units per cubic foot. This fuel can be fed to pro-



Fig. 7. A 1,100-hp. Suction Gas Producer Power Plant.

every few hours, according to quality of the coal, in order to break up and remove clinkers, which would otherwise interfere with the making of sufficient gas. Poke holes are provided so that every part of the fire can be reached conveniently.

#### FUELS.

Anthracite in buckwheat or pea sizes, lignite, coke, and charcoal are the fuels commonly used. In many sections the small sizes of anthracite can be bought cheaply in car lots. For example, in Chicago the carload price of buckwheat anthracite is usually about \$3.75 per ton. In some of the states west of Chicago the price varies from \$5 to \$7 per ton. At some points in southern Canada these small sizes of Pennsylvania anthracite can be bought at \$3 to \$4 per ton. In some of the eastern states, which are nearer the source of supply, the prices are less.

The lignite producer offers cheap and reliable power in sections where this fuel is available. There are enormous deposits of lignite in Texas, Arkansas, Louisiana, North Dakota, Montana, Wyoming, Colorado, and other western states. This can usually be had at a price of \$1 to \$3 per ton. At Smithville, Tex., where a 150 hp. lignite producer plant is installed, the cost is \$1.50 per ton. Lignite is of little value for steaming purposes, mostly due to the large amount of moisture; but

tests were obtained from the factory of Fairbanks, Morse & Co. at Beloit, Wis., resulting from extensive experiments.

TABLE 1. ANTHRACITE.

Sample No.	B.T.U. per lb.	Fixed carbon.	Volatile.	Ash.	Moisture.	Sulphur.	Quality.
65	15,424	88.8	7.4	2.9	0.9	0.99	Very good
101	12,952	82.5	8.2	2.5	0.8	0.82	Good
76	12,068	72.9	5.7	18.9	1.5	0.86	Poor
71	13,332	77.2	9.3	12.4	0.1	0.73	Fair
89	14,716	79.5	8.1	10.5	2.1	0.59	Good

TABLE 2. COKE.

Sample No.	B.T.U. per lb.	Fixed carbon.	Volatile.	Ash.	Moisture.	Sulphur.	Quality.
12	12,787	86.7	2.4	8.4	2.5	0.92	Good
77	14,213	92.3	1.7	8.2	0.60	0.59	Very good
94	9,528	76.4	3.7	15.3	2.6	0.59	Rather poor
97	12,811	80.4	1.7	6.1	1.5	0.55	Very good

TABLE 3. LIGNITE.

Sample No.	B.T.U. per lb.	Fixed carbon.	Volatile.	Ash.	Moisture.	Sulphur.	Quality.
51	11,624	20.3	46.1	6.2	27.3	1.01	
57	8,753	29.4	35.1	7.1	27.8	0.63	
95	11,566	41.8	26.7	3.2	17.8	0.41	
102	9,765	36.8	35.8	10.7	17.2	0.49	

With the best coal there is little formation of clinker that will not work down to the grate without poking from the top, and many European producers have no top poke holes. These are not successful on American coals, for while it is always desirable to get the best coal, it is practical to operate continuously on an average or even a poor coal, by working the

producer in any size that will go through the charging hopper and it causes no serious trouble from clinkers.

#### VERTICAL TYPE OF PRODUCER GAS ENGINES.

These engines are made in sizes of 200 hp. and smaller. By combining several units, plants of 800 to 1,000 hp. or larger have been installed. Fig. 5 illustrates a

modern Fairbanks-Morse engine of this type. Sectional view is shown in Fig. 6. It may be noted how carefully these engines are designed.

The present system of ignition is a great improvement over the methods formerly used. The make-and-break igniter is so constructed that it can be adjusted to spark as early or as late as desired, when engine is running or at rest, by means of a convenient hand lever. A single lever controls the time of ignition for all cylinders. This is a feature of much importance, especially with producer gas, as it permits timing the ignition to give the greatest possible power and economy with any particular grade of gas and when the engine is running. In addition, there is an independent adjustment for each igniter which is operated by drop cam.

Igniters can be removed, inspected, and cleaned without interfering with other working parts, and they are located most conveniently. As the successful operation of a gas engine depends largely upon the igniter, the value of these features cannot be emphasized too strongly.

Both valves are mechanically operated from a single cam shaft, which is located inside the crank case. This minimizes the amount of noise, and furthermore the two-to-one reduction of gearing includes pinion, which is made of alternate layers of steel and red fiber. These features insure a quiet running engine.

The simple fly-ball governor is of a carefully designed pattern. This operates a balanced disk valve which is so constructed that there is no frictional contact or surface to become fouled by any impurities in the gas. This is especially important with engines operating on producer gas. The governor insures very close regulation, adapting the engine for electric lighting and other service requiring uniform motion.

Lubrication is effected by means of a single elevated oil reservoir, which is provided with separate brass pipe with individual sight feed for each bearing. This is an effective system of engine lubrication. The drip from the different bearings collects in the base of the engine, which is drained by means of a small pump. The oil is run through a filter and is then used over again.

Each engine is fitted with a hand-operated speed regulator, by means of which speed can be reduced when engine is running.

One cylinder of each engine is fitted with automatic compressed air starting gear. This can be thrown into or out of action by the movement of a single lever, and the engine is started automatically on compressed air.

#### PRODUCER PLANTS IN ACTUAL SERVICE.

A very unique producer has been installed in Iowa for operating a large dredge. A 150-hp. Fairbanks-Morse producer plant is on this dredge, some of the machinery of which is electrically operated, and the engine also furnishes power for electric lighting. This plant operates 24 hours a day and is handled by two men, one for each 12-hour shift.

From report on a 50-hp. producer gas plant in a marble works in Tennessee,

the statement is made that they use only 18 ordinary hods of buckwheat anthracite per day of nine hours at a total cost of \$1.39 for the coal. At this plant the fire is poked once in the morning before starting and once at night after shutting down. Outside of this the plant requires little attention.

At one 150-hp. installation in western Iowa, actual figures show that the cost of coal and oil is \$105.90 per month. With their former Corliss engine steam plant, and with somewhat smaller load, the cost of coal and oil amounted to \$360.00 per month.

A remarkable showing has been made at a point in Texas, where the City Electric Light and Water Works plant is now being operated by a 150-hp. Fairbanks-Morse producer gas engine, using Texas lignite for fuel. The saving in operating expenses is \$200 per month.

One of the largest suction gas pro-

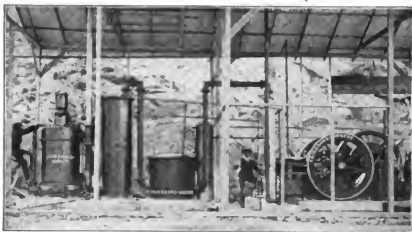


Fig. 8. Fairbanks-Morse Producer Gas Hoisting Plant in Mexico.

ducer plants in the United States is illustrated in Fig. 7. This plant comprises six 150-hp. engines and one 200-hp. engine—1,100 hp. in all—complete with suction gas producers, using anthracite for fuel. This plant is in Wisconsin and is operated 20 to 24 hours each day, excepting Sundays and holidays.

A series of tests have recently been made on a 150-hp. Fairbanks-Morse engine and anthracite producer, for continuous runs of 24 hours, at one-quarter load, one-half load, three-quarter load, and full load, the object being to determine the comparative economy at different loads.

The coal used was an ordinary grade of buckwheat anthracite, running rather high in ash, the analysis being as follows: Fixed carbon, 78.9%; volatile, 5.3%; ash, 13.0%; moisture, 2.7%; sulphur, 0.77%; British thermal unit, per lb. as fired, 13,590.

Some of the results of these tests, including the coal consumption per brake horsepower hour, are given below:

Economy tests have often shown a lower consumption than indicated above—frequently less than 1 lb. of coal per brake horsepower hour at approximately full load.

#### Transvaal Stope Drill Competition.

A competition will be held in the Transvaal during 1909 with the object of finding a small drill capable of economic use in the narrow stopes on the Witwatersrand. After the elimination by preliminary trial of such machines as are obviously outclassed or unsuited to the local mining conditions, the balance, reduced to manageable number, will undergo a test of 300 consecutive shifts, excepting Sundays and legal holidays, under conditions which in every way conform to regular mining practice in the district. They will be set up in stopes varying in width from 20 ins. to 48 ins., and with a dip of from 20° to 90°. About 90% of the holes will

be down-holes. Drills with any other form of motive power will be eligible. Air pressure may range only between 60 and 75 lbs. per sq. in. at the end of the pipe line as shown by recording gages. As the need of the local mining industry is for a one-man machine, no entry weighing over 100 lbs. will be accepted and even lighter ones are most desirable. All holes must reach 42 ins. in depth to be counted, except under such circumstances as may be specially authorized by the managing committee. The last bit used shall gage at least 15/16 in.

Two prizes, a first, of \$20,000 and a second, of \$5,000, will be awarded according to the minimum figures obtained by dividing the total cost (composed of first cost of machines and rigging less valuation at end of competition, wages, air, water, drill sharpening, maintenance and stores) by the footage drilled. All machines with accessory parts must be delivered at Johannesburg, free of charge, on or before Jan. 31, 1909.

Load	R. H. P.		Speed, Rev. per min.	Coal in 24 hours.	Cooling water per R. H. P.		Steam per pound of coal, lbs.
	on engine.				per hour.	Gals.	
Full	119.4	224	3828	1.07	5.0	0.48	
¾	112.1	225	3185	1.13	5.8	0.45	
½	75.4	226	2369	1.23	6.8	0.41	
¼	38	228	1559	1.74	12.1	0.35	



## An Old Spanish Air Compressor.

BY C. F. SPALDING.

Owing to recent articles appearing in *The Mining World*, a short description of an old air compressor I ran across in the interior of Honduras might be interesting.

I stumbled onto the remains of an old smelter a few miles from the trail leading into Tegucigalpa and about four to five days' ride from San Pedro Sula. The place was overgrown with jungle and the natives themselves knew nothing about the plant or when it was abandoned. I found it by following an old ditch line about three-fourths of a mile long, while looking for placer workings.

The dump showed about 100 tons of slag (copper) and some raw copper ore around the foundation of the stack; but what interested me most was the means they evidently used to make the air blast. Back of the stack a hundred odd feet was a small tunnel just large enough to crawl into comfortably. I went into it expecting to see the place from

diameter. This was badly rotted and fell apart on touching.

The pipes in the upraise were in a fair state of preservation. The inner end of the tunnel showed traces of being at one time bulkheaded. Running through the bulkhead was a wooden flume made from a native wood that is practically indestructible.

This flume was about 12 to 18 ins. inside dimensions and extended through the bulkhead, making a turn to the bottom of the room. Evidently this apparatus was used somewhat as follows; the water rushing down the tubes from the penstock would suck in air; this would be liberated in the inner room and taken out for blast purposes through the upper bamboo pipe in the tunnel, the water being discharged through the wooden flume at the bottom of the bulkhead.

The bottom of the flume being 5 to 6 ft. below the outlet would give an air pressure of 2½ to 3 lbs. I could not figure out any other use for the layout than that of compressing air, and must say that it was sometime before it dawned on me

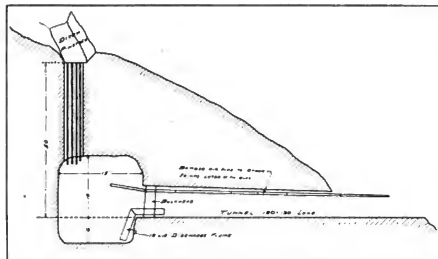


Diagram of Ancient Air Compressor.

which they obtained their ore, and instead found the compressor plant.

The tunnel was driven into the side hill about 120 to 130 ft. At the inner end it was enlarged to a room about 10 to 15 ft. high, 15 ft. long and 6 to 8 ft. wide. The room floor was several feet below the level of the tunnel floor, approximately 6 to 7 ft., but being partially filled with debris, sticks, leaves, etc. (packed in by tigers for their lair), it was hard to find the real bottom.

At the inner end of the room was a vertical upraise about 3 ft. in diameter through to the surface. This hole was filled with bamboo pipes 6 to 10 ins. in diameter (14 pipes in all) set in clay, filling the upraise solid. This got me interested and I started to investigate. At the top of the upraise and a end of the ditch was a crude penstock built with brick, showing where the water was discharged from the ditch onto the top of the bamboo pipes and flowed down the pipes. Leading into the tunnel, along the roof, was a bamboo pipe 4 to 5 ins. in

what I was seeing. I could hardly believe that these old fellows knew enough to figure out a scheme like that.

The place had been abandoned about 150 years or more, as there were trees of that age growing on the dump and ditch line.

Pocket benches on Seward Peninsula, Alaska, are mere remnants of old channels which usually hang high on the valley walls. They cannot as a rule be traced in any definite system, for on many streams only one or two small deposits of this kind are discovered.

The currency of the Rampart region in Alaska, as in the early stages of most placer camps, is gold dust. The gold assays from \$14.88 to over \$19 per oz., and passes at \$15.50 to \$18 per oz.

First-class passenger rates from Seattle, Wash., to Fairbanks, Alaska, the center of active gold mining, ranges from \$125 to \$150.

## Mining Mica in North Carolina.

BY D. B. STERRETT.\*

For a number of years North Carolina has led in the production of mica in the United States. Mines have been worked in over 20 counties in the western part of the state. The principal production has come from the counties northwest of the Blue Ridge mountains, and among them the following have been important producers: Mitchell, Yancey, Macon, Jackson, Haywood and Ashe.

During 1907 there was a considerable production from Cleveland and the adjoining counties, and from Stokes county, all in the Piedmont plateau region to the southeast of the Blue Ridge.

Very large blocks of mica have been found in the mines of some of these counties. During 1907 a crystal of mica was found in the mine of the Franklin Kaolin and Mica Co. at Iola Bridge, Macon county, that was 29 ins. wide, 36 ins. long and about 4 ft. thick. This crystal was not solid, however, and the perfect sheets obtained from it were considerably smaller than its area.

As a rule, the methods of mining mica in North Carolina are, simple. A deposit is opened by crosscuts or trenches along the outcrop, and the mica is followed, wherever it may lead, by inclines, shafts, drifts and stopes. Since the occurrence of mica in pegmatite is often very irregular, the workings are apt to be unsystematic. It is unusual, and as a rule inadvisable, to open a mica mine by a shaft or adit calculated to cut the "vein" at a certain point, unless a careful test has first proven the continuity and regularity of the pegmatite; for the latter may have pinched out, changed its dip or strike, or been folded back on itself, so that the development work may fail to reach it; or the "vein" may be found barren of mica when finally cut.

Mica is found in several types of pegmatite. Some of these appear to be regular dikes with a very coarse granitic texture, while others are doubtless veins. In the latter type there is generally a decided banding of the two prominent minerals of pegmatite; that is, the feldspar and the quartz. These minerals occur in separate sheet-like masses in the pegmatite lying parallel to its walls, while the mica is generally found in the feldspar next to the quartz or walls.

## Preservation of Mine Timbers.

Co-operating with the Forest Service of the United States Department of Agriculture, the Tennessee Coal, Iron & Railroad Co., of Birmingham, Ala., will erect a timber-preserving plant near Birmingham for the purpose of treating mine timbers with creosote, solutions of zinc chloride and common salt. It is thought that the preservative treatment of the timber will greatly prolong the period of its usefulness, effect a saving in coal and iron mining, and thereby promote the interest of wood preservation in the entire mining community. E. H. Ford of the Forest Service will be in active charge of the work, with an office in Birmingham.

\*Extract from *Mineral Resources of T.* 8, for 1907.

# The Correlation of International Strata.—III.

By HORACE F. EVANS.

Geologist.

The Report of Progress Canadian Geological Survey contains information concerning pre-Cambrian formation in the eastern as well as in the western portion of the Dominion. It is appropriate here to touch briefly on this subject.

The first attempts to classify the pre-Cambrian deposits were made by Sir William Logan and his assistants on the Canadian Geological Survey. They recognized not long after 1843 that underlying Paleozoic rocks of Canada there occurs a vast assemblage of unaltered unfossiliferous beds to which they assigned the name Huronian. They also found that the rocks in immediate descending succession to be a great series of crystalline granites, gneisses and schists.

Huronian strata consist principally of a quartzite with a great assemblage of greenish chlorite slate. Limestones are reported rare in the series, but there is one band having a thickness of 300 ft. which has a considerable extension north of Lake Huron. These beds have a combined thickness of 1,800 ft. So far no fossils have been found in the beds, but it does not follow from this that organic remains do not occur. When governments learn the necessity of having the paleontologist in the field along side of the geologist, then there will be a great increase of paleontological horizons. There is a close relationship between the scarcity of the fossils and the scarcity of the paleontologists, on this continent.

Immediately under the Huronian north of the river St. Lawrence occurs another vast assemblage of mica schists, gneisses quartzites and limestones which have an estimated thickness of 30,000 ft. This formation as a whole is known as the Laurentian and it is known to occupy an area of about 200,000 sq. miles, equal in areal extent to that occupied by the Columbia lava in Oregon, Washington and British Columbia.

It is known that the beds underwent great disturbances prior to the laying down of the Potsdamian or upper Cambrian and it has further been found that the newer or upper Laurentian sometimes called the Norian or Labrador series has a thickness of 10,000 ft. and that it is unconformable to the older rocks.

The lower Laurentian has a thickness of 20,000 ft. It consists largely of a massive gneiss of reddish tint orthoclase being largely preponderant.

It was in the Lower Laurentian that Sir William Logan in 1859 found what he thought to be a foraminifer. The supposed specimen was named, as explained in a previous article, "Foroon Canadense" (Dawson), but was afterwards shown to be of inorganic origin.

In British Columbia in 1888 rocks of Archaean age or supposed Archaean age were recognized in the Interior Plateau of British Columbia near Adams lake. It is maintained by the observers of the Canadian Geological Survey who made the investigations that the Cambrian rocks, or what are supposed to be Cambrian rocks in that region, rest immediately on the

*The Pre-Cambrian Deposits were first classified here shortly after 1843. Rocks of Archaean age in Interior Plateau were recognized in 1888.*

*Devonian and Silurian do not appear to occupy any areal extent in the Interior Plateau of British Columbia.*

Archaean foundation—the "fundamental complex" of some authors. Similar rocks were found later and studied by the Canadian Geological Survey in the vicinity of Kootenay lake. The lower or Archaean series was, it is recorded, there recognized having a great thickness of overlying rocks—supposedly Cambrian and comprising black micaceous argillites immediately superposed by green and gray schists. These rocks, it is stated by Dawson, correspond with those previously found by him and his assistants on Shuswap and Adams lake. When the West Kootenay region was examined, the official report based on examination contained a general section combining the results of the works in the region with those previously obtained on Shuswap and Adams lake, and the several rock areas were distinguished under the provisional names of Shuswap Archaean, Nisconli and Adams lake, Cambrian.

It was found that the gray and green schists of Kootenay lake, comprising the second group, were composed of altered volcanics the great alteration being due to the dynamic pressure which they had undergone. The best evidence of this metamorphism is seen between Adams lake and Shuswap lake.

Dawson himself wrote that the comparison thus instituted made it possible to correlate a large part of the rocks previously observed on the Kootenay, Shuswap and Adams lake, as well as a part of those of the interior plateau of British Columbia with the recognized strata of the Rocky mountains proper, where Cambrian fossils occurred, but the correlation was necessarily made on lithologic grounds, because no fossils of Cambrian age had been found by the Geologic Survey in the western section in British Columbia. It is admitted in the reports on this subject that an element of great doubt was introduced into the question, because it was suspected that carboniferous rocks known by their contained fossils had in the table been mixed with supposedly Cambrian strata. Where correlations proceed on lithologic grounds, any attempt to make tabular sections of the strata must necessarily be mixed and incomplete. In such cases, Dr. Smith says, "The descriptions should be made brief and general and correlations especially in the case of the older rocks should be somewhat broad and in many cases merely tentative."

Whatever confusion may arise resulting

from an attempt to give stratigraphical sections as corresponding with other sections, because of similar physical characteristics, the non-technical reader is cautioned against drawing any conclusions that might suggest Cambrian rocks as having been laid down on Carboniferous strata, but the converse was possible for geologists recognize great stratigraphical breaks. Near Oroville, Wash., close to the trestle of the Washington Great Northern railway the Similkameen river has cut its way down to the base level of erosion through strata suspected to be of early Tertiary age, and it is seen that the supposedly Tertiary strata are resting somewhat conformably on the older rocks which are supposedly carboniferous. Thus these later rocks appear to be of Permian date, as suggested by the contained fossils.

It does not appear from an investigation by the writer so far that Devonian and Silurian rocks occupy any areal extent in the Interior Plateau of British Columbia, or in the Northern Cascades, though there may be unrecognized areas. The information in possession of the writer is to the effect that there is a great stratigraphical break between supposedly Cambrian and known Carboniferous strata.

That there are vast assemblages of Cambrian and Carboniferous rocks in British Columbia, we must accept as likely enough, but when it comes to the question of exact correlations we must be precise, as the issues involved are of supreme importance in economic mining.

The close relationship of geology with all that relates to the earth, to chemistry, to mining, to the arts and to the sciences, must deeply impress us of the advantage of every one making himself more familiar with the conditions on the earth.

A knowledge of geology even to a very limited extent may perhaps prevent us from plunging into the vortex of follies and of expensive absurdities in the name of "mining."

## Low Grade Fuel for Power Development.

The United States Geological Survey has been experimenting with the gas producer and gas engine for several years, and the tests in the gas producer at the Government plant have shown that many fuels of such low grade as to be practically valueless for steam-furnace purposes, including slack coal, bone coal and lignite, may be economically converted into producer gas and may thus generate sufficient gas power to render them of high commercial value. In this way lignite beds underlying from 20,000,000 to 25,000,000 acres of public lands, heretofore supposed to have little or no commercial value, are shown to have a large value for power development. This is of importance to the West, and makes possible a great industrial development there. The Geological Survey recently issued a bulletin on the "present status of the producer gas engine."

### Coal Mining in Indiana.

By F. W. PARKER.\*

Indiana continues to rank sixth among the coal producing states and in 1907 it was a close rival of Alabama for fifth place.

The total coal production in 1907 was 13,985,713 short tons, having a spot value of \$15,114,300, an increase over the preceding year of 1,893,153 tons, or 15.66%, in quantity, and of \$1,998,081, or 15.23%, in value. The growth of the industry in the last three decades has been remarkable. The production in 1870, reported by the census was 437,879 tons; in 1880 it was 1,454,327 tons; in 1890, 3,305,737 tons. In the closing year of the last century the production had nearly doubled again, amounting to 6,481,686 tons, and this output was once more nearly doubled in 1907.

The total number of men employed in the mines in 1907 was 21,022, who worked an average of 197 days, against 20,970 men, who worked an average of 173 days, in 1906. The average production for each man employed in 1907 was 665 tons, against 576.7 tons in 1906 and 469.7 tons in 1905. The average daily tonnage per man was 3.38 in 1907, against 3.3 in 1906 and 3.11 in 1905.

The increased productive capacity per man was due in part to the increased use of mining machinery, the statistics for 1907 showing a total of 543 mining machines in use, with a total machine-mined product of 5,510,697 tons, against 471 machines in use in 1906, with a machine-mined product of 4,251,749 tons. In 1906 the percentage of the machine-mined product to the total was 34.16; in 1907 it was 37.97. Practically all of the important mines in the state are operated on an 8-hour basis, 18,323 mines out of a total of 21,022 reporting eight hours as the length of the working day. The mines working nine or ten hours are practically local or comparatively unimportant producers.

According to the report of James Epperson, state mine inspector, the number of men killed was 52, while 451 were injured. Of the 53 men killed, two met death through gas and dust explosions, 18 through explosions of powder and windy shots, and 16 through falls of roof or coal, and 17 deaths were attributed to other causes. Of the 451 men injured, 153 were hurt by falls of roof or coal, 33 by powder explosions and windy shots, and 16 by gas and dust explosions, while 249 injuries were attributed to other causes.

One company reported in 1907 having washed a part of its production. The washery contains four jigs, and washed in 1907, 23,825 tons of coal, yielding 21,629 tons of cleaned coal and 2,196 tons of refuse.

The eastern edge of the eastern interior (or central) coal field underlies the southwest portion of Indiana, the total area in the state embracing 6,500 square miles and underlying 26 different counties, in 18 of which at present coal is produced on a commercial scale. All

of the coal produced in Indiana is classed as bituminous.

The coal along the eastern edge of the field is known as block or semi-block coal. It is very pure, dry, noncaking coal, and derives its name from the almost perfectly rectangular blocks into which it breaks, because of the pronounced cleavage planes which intersect each other nearly at right angles.

The rest of the coal, distinguished locally as "bituminous," is classed as coking and gas coal, though it is not of sufficiently high grade to compete for those uses with the high grade coking and gas coals from the east. As a steam coal it competes successfully with the Appalachian coals where the freight rates are slightly in its favor. Cannel coal is successfully mined at one or two points.

Coal has been found at no less than 29 different horizons, and as many as 17 beds have been passed through in a single drilling in a vertical distance of 800 ft. Most of these are thin but beds of sufficient thickness to be worked are found at eight different horizons. At present the commercial coal is coming from six of these.

M. R. Campbell estimates that the coal fields of Indiana officially contained 44,169,000,000 short tons of coal. The aggregate production to the close of 1907 amounted to 159,440,390 tons, and Mr. Campbell estimates the exhaustion represented by this production at 239,000,000 tons, or 0.54% of the estimated original supply.

### Value of Coal in Manchuria.

Consul Roger S. Greene forwards from Dalny a Japanese official analysis of the coal taken from the Fusun mines of the South Manchuria railway. The consul says that a sample has been sent to the United States War department to be tested, with a view to making a tender for supplying the army transports.

The company hopes to be able to put on the market about 200,000 tons during the coming year and to increase this figure to 1,000,000 tons and some hundred thousand tons in five or six years, but a great deal depends on the development of transportation facilities. At present the quantity that can be marketed is so small that there is sufficient local demand to take practically the whole output at comparatively high prices.

The price *l. c. b.* at Dalny is £1 (\$1.86), at which figure an export business could hardly be worked up, but it is certain that the coal can be profitably sold at a much lower figure. At present it is not popular on this market, and a considerable quantity of Japanese coal is still used here, some of the complaints being that the flame of the Manchurian coal is too long and that it breaks up easily into small pieces, so that when put on the fire a good deal drops through the grate before being fully consumed, and burning in the ash pan injures the grate. It is considered, however, to be a promising gas coal, and possibly if the price is made lower the opening of this new coal-supplying region may be of interest to consumers on the Pacific coast of the United States.

### Fuel Investigations and Smoke Problem.

Statistics collected by the Government indicate that the nation has consumed about seven billion tons of coal up to the present time. Last year the consumption was more than four hundred million tons. During the past ten years nearly as much coal was used as had been used during the preceding century. This increase in the use of coal during the past century has been so great that it is concluded that if the consumption continues to increase at the same rate, the coal fields of this country will be exhausted before the end of the next century. However, if by some means the increase in the use of coal can be checked and the output of the mines kept down to the present figures, there will be no occasion to worry about the coal supply. But the increased demand for coal will probably continue and we may reasonably look for a gradual rise in the price of coal as it becomes more difficult to mine it. Only the best and most profitable seams are being mined at the present time, the inferior coal being left in the ground.

As used at present for heat, light and power, the losses are so great that, of the total heating value of the coal, less than 5% is converted into useful work in the ordinary manufacturing plant, and even some of the largest and best power plants are able to utilize only about 10% of the energy in the coal. In railroad operation only from 3 to 5% of the coal value is realized for pulling the train.

It is estimated that only one-seventh of 1% of the fuel value is actually converted into light in an incandescent lamp.

Nearly two million horsepower in the form of gas is allowed to escape from the blast furnaces of the country. This condition is rapidly being changed by the installation of gas engines to develop the power.

There is also a great fuel waste in the manufacture of coke, besides the loss of many valuable byproducts. It is estimated that these losses amount to fifty million dollars annually.

### Colliery Notes.

Split coal mined in Scotland is an important variety of canal coal.

The Derring Coal Co. interests have purchased 1,000 acres more of coal lands near Danville, Ill., and now own 10,000 acres.

The Dominion Coal Co.'s July output will approximate 308,000 tons, 18,000 more than the best previous month in the history of the company. About 15,000 tons were lost by delays from accidents. The year's output to date is 2,900,000 tons.

The coal development situation in the three-states region is considered better. In the Kentucky, Tennessee and Virginia fields centering about this point operators are gradually renewing operations at plants which have been almost entirely shut down, and conditions are expected to continue to improve during the next few months until by fall the trade will be at its normal stage.

\*Extract from *Mineral Resources of U. S.* for 1907.

## Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

## The Editors:

Kindly make the following corrections in my article on concrete work in The Mining World for Aug. 1:

On page 172, eighteenth line from the bottom of first column, " $P = 1/3d$ " should read " $M = P \times 1/3d$ ."

Near the bottom of the middle column on page 172, where the formula reads " $X \times 1.6 \text{ toe}$ " it should read " $X \text{ toe} \times 0.6 \text{ toe}$ ."

At the top of the last column on page 172 where D is said to be diameter in inches, the following statement should be inserted: "When the pressure is given in pounds per square inch, then D is diameter in inches, but when pressure is given in pounds per square foot, then D is diameter in feet, and A may be for 1 inch or for 12 inches, depending upon the unit used."

I am not blaming the compositor or the proofreader for the above errors, for I have no doubt they were in the original manuscript, with the exception perhaps of the first one.

ERNEST MCCLINTOCK.

Chicago, Aug. 2, 1908.

## New Publications.

Publishers are invited to send all books and pamphlets, treating of subjects relating to mining, metallurgy, chemistry and kindred industries, in the Review Editor of The Mining World. When ever possible state selling price of publications.

*Journal of the Mining Society of Nova Scotia, Vol. XI, 1906-7.* Edited by H. Piers. Halifax, N. S., 1908; published by the Society. Pages, 152.

*Geological Survey of Georgia: A Preliminary Report on the Underground Waters of Georgia.* By S. W. McCallie, state geologist. Atlanta, Ga., 1908; State Printers. Pages, 370; illustrated.

*Lead and Zinc in the United States.* By Walter Renton Ingalls. New York and London, 1908; H.M. Publishing Co. For sale by The Mining World. Pages, 368; illustrated. Price, \$4.

This ably written book comprises an economic history of mining and smelting of lead and zinc and the conditions which have affected the development of the industries. The preparation of this work was undertaken at the request of the Carnegie Institution of Washington, and with its assistance. The 17 chapters on lead describe the occurrence of lead ore, metallurgy, refining, marketing and uses, production, consumption and price, the tariff, trade agreements and combinations, etc. Six chapters are on zinc, and these discuss the occurrence of zinc ore in the United States, mining, ore dressing, smelting, and the commercial conditions which influence the industry. The author has shown care and good judgment in compiling the data reviewing the history and development of the lead and zinc industries. The statistics generally are up to the year 1906, and are so arranged as to facilitate comparison. A good index accompanies the book.

## Barytes Industry of United States.

BY E. F. BURCHARD.\*

Barytes, one of the many pigments mined in the United States, is used not only in paints, but in enameling iron, oilcloth, and paper collars; in the manufacture of paper, cloth, and rubber; in refining sugar; as an adulterant, and in the manufacture of salts that have a wide chemical use.

The production of barytes in the United States reached a maximum in 1907, of 98,621 tons, valued at \$291,777, having been mined and prepared for shipment to the mills. The increase of nearly 40,000 tons in the production over 1906 was due principally to the opening of new mines, both by old and new operators, in both old and new localities.

The chief deposits are found in Missouri and in the Appalachian mountains, principally in Virginia, Tennessee, and North Carolina. There is a newly developed area in Kentucky and several deposits, mostly undeveloped, in the Cumberland valley, Pennsylvania.

By the tariff act of 1897, carbonate of baryta may be imported duty free, and importers contend that this privilege extends to the purified carbonate as well as to the natural salt. The Treasury department, however, holds differently, and is now appealing from a court decision sustaining the importers, and is collecting a duty of 25% *ad valorem* as levied on chemical compounds not specified.

Barytes imports in 1907 were valued at \$96,542 manufactured, and \$76,883 unmanufactured; barium compounds, \$85,713. The increase was large in all three classes.

Barium is often used in the United States as a substitute for strontium, especially in the refining of beet sugar, despite the fact that the hydroxide, which is the form used, is said to be poisonous. Strontium is not produced commercially in this country, probably because of the cheapness of barytes, but it has been noted to occur in the vicinity of the Great Lakes, in Kentucky, Kansas, Pennsylvania, and Texas.

In 1907, \$1,242 worth of the oxide of strontium was imported; and it is probable that a larger quantity of the nitrate was also imported as unclassified chemical material.

**United States Coinage.**—The coinage executed at the mints of the United States during July was as follows: Double eagles, \$175,000; half dollars, \$309,000; quarter dollars, \$161,900; dimes, \$109,000; total, \$808,600.

France imported 4,890,210 tons of coal, 601,110 tons of coke, and 293,110 tons of briquets during the first four months of this year. The exports for the same period were 306,100 tons of coal, 11,669 tons of coke, and 35,729 tons of briquets.

Florida phosphate shipments for the first half of 1908 were 545,512 long tons of hard rock, as against 299,117 tons last year; and 471,859 tons of lamp phosphate, as against 240,921 tons in 1907.

\*Extract from Mineral Resources of U. S. for 1907.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 20 cents with the title, number, and date of patent to The Mining World. Remittances may be made by coin, stamps or postoffice money order.

## WEEK OF JULY 28, 1908.

**Machine for Extruding Metals.** George H. Benjamin, New York, N. Y., assignor to The Coo Hiras Manufacturing Co., a corporation of Connecticut. (492,161; filed June 9, 1906.)

**Magnetic Separator.** Charles G. Buchanan, Brooklyn, N. Y. (492,666; filed Apr. 5, 1906.)

**Process of Manufacturing a Sea Water Retaining Cement from Blast Furnace Slag.** Heinrich Colossius, Berlin, Germany, assignor, by means assignments, to Colossius Cement Co., a corporation of New Jersey. (492,706; filed May 17, 1907.)

**Process for Manufacturing Cement by Treating Hot Liquid Blast Furnace Slag with Solutions of Alkaline Substances.** Heinrich Colossius, Berlin, Germany, assignor, by means assignments, to Colossius Cement Co., a corporation of New Jersey. (493,707; filed May 17, 1907.)

**Process of Manufacturing Cement by Treating Hot Liquid Blast Furnace Slag with Milk of Lime.** Heinrich Colossius, Berlin, Germany, assignor, by means assignments, to Colossius Cement Co., a corporation of New Jersey. (493,708; filed May 17, 1907.)

**Crusher for Ore and Other Materials.** Henry Eggers, Denver, Colo., assignor to The Samson Manufacturing Co., Denver, Colo. (493,712; filed Sept. 16, 1907.)

**Dredging Apparatus.** David P. Moore, Washington, D. C. (493,743; filed Apr. 11, 1906.)

**Air Valve for Air Compressors.** John G. Leyner, Denver, Colo. (493,852; filed May 28, 1906.)

**Grinding Mill.** Joseph Barr, Allentown, Pa. (493,853; filed May 28, 1906.)

**Composition for Removing Inclusions from Bodies.** Follis, Cincinnati, Ohio. (493,934; filed Jan. 21, 1908.)

**Hoisting Machine.** Charles E. Grant, Chicago, Ill. (493,939; filed Aug. 1, 1907.)

**Mining Tool.** Maudie R. Thomas, Ottumwa, Iowa, assignor of one-half to William H. C. Jaques, Ottumwa, Iowa. (493,950; filed Mar. 11, 1908.)

**Ore Concentrator.** Gilbert H. Davidson, Morenci, Ariz. (493,985; filed Feb. 2, 1908.)

**Means for Ventilating and Expelling Water from Mines.** Patrick H. Duxack, El Paso, Tex. (493,988; filed Oct. 16, 1907.)

**Process of Impregnating Wood.** Julius Rutgers, Berlin, Germany; Andreas Collatrop, Copenhagen, Denmark; and Fritz Noebe and Gustav Kraemer, Berlin, Germany, executors of said Rutgers, deceased. (494,061; filed May 26, 1903.)

**Metallurgical Furnace.** William N. Best, Los Angeles, Cal., assignor to John H. Best and Edna Best, Quincy, Ill. (494,107; filed Dec. 31, 1903.)

**Process for Facilitating the Combustion of Fuel.** Newell W. Bloss, Providence, R. I., assignor, by means assignments, to The Coal Treating Co., Quincy, Ariz., and Boston, Mass., a corporation of Arizona. (494,110; filed May 16, 1903.)

**Smelting Process.** James H. Boyd, Denver, Colo. (494,111; filed Feb. 14, 1908.)

**Retort Charging Apparatus.** Harry Crocker, Iowa, Kans. (494,119; filed Dec. 2, 1906.)

**Hoisting Machine.** William H. C. Jaques, Ottumwa, Iowa. (494,125; filed Apr. 2, 1908.)

**Welshing Mechanism for Coal Pockets.** George W. Freeland, Melrose, Ill., assignor to William H. C. Jaques, Ottumwa, Iowa. (494,132; filed Oct. 22, 1907.)

**Coal Pocket or Bin.** George W. Freeland, Melrose, Ill., assignor to William H. C. Jaques, Ottumwa, Iowa. (494,132; filed Nov. 20, 1907.)

**Gas Producer.** William B. Hughes, Cleveland, Ohio. (494,146; filed Aug. 7, 1907.)

**Deep Well Drill.** William Hutchings, Ipswich, Mich. (494,147; filed July 9, 1906.)

A placer is an unconsolidated deposit accumulated by mechanical processes, carrying one or more minerals in commercial quantities.

# Current Literature on Mining, Metallurgy, Etc.

*A History of the Tunnel Boring Machine.* Geo. J. Bancroft. This is the first article of the series which will describe the various forms and patents under which the tunnel boring machine has appeared since 1856.—*Mg. Sci.*, July 23, 1908; pp. 534; illus. 20 cents.

*Experimental Electric Smelting.* Louis L. Farnsworth. The experiments described were carried out by the writer at Stanford University, California, to learn some of the fundamental principles of electric smelting and to obtain data of their working.—*Electrochem. & Met. Ind.*, August, 1908; pp. 2; illus. 40 cents.

*Cost of Producing the World's Supply of Copper.* James Ralph Finlay. The great producing mines are divided into three classes, and the costs per pound of metal for each class are compared.—*E. & M. J.*, July 25, 1908; pp. 31-6. 20 cents.

*Concentration of Slimes.* Edwin A. Sperry. In this, the first part of an instructive paper, the author discusses the subjects of crushing and grinding.—*West. Chem. & Met.*, July, 1908; pp. 94. 75 cents.

*The Cochiti Mining District, New Mexico.* Percy E. Barbour. This is a low-grade gold-silver camp which has a reputation for failure, but which possesses, in the opinion of the writer, many promising though unexplored veins.—*E. & M. J.*, July 25, 1908; pp. 21-6; illus. 20 cents.

*Making Zinc-Lead White at Canyon City.* Description of the plant operated by the United States Smelting Co. at Canyon City, Colo.—*The Mining World*, Aug. 1, 1908; pp. 31-6; illus.

*Gold Mining in Porto Rico.* William B. McKinlay. Continuation of a previous article.—*M. & S. P.*, July 25, 1908; pp. 34; illus. 20 cents.

*The Mineral Resources of Korea.* Hallet R. Robbins. Describes the work of the Oriental Cons. Mining Co. and other properties.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 14; illus. 60 cents.

*Gold: Its History and Economic Development.* Evans W. Baskett. The first part of an interesting series; it describes the use of gold as money and ornament, the influence of gold production on population, and value as an alloy.—*The Mining World*, Aug. 1, 1908; pp. 14.

*Notes on Southern Oregon as Prospecting Field.* Dennis H. Stovell. Describes the geology and success of work done by prospectors.—*The Mining World*, Aug. 1, 1908; pp. 11-6; illus.

*Dip and Pitch.* R. W. Raymond. This is a postscript to the writer's previous note commenting on Prof. Louis' conception of "pitch."—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 6; illus. 60 cents.

*Some Striking Features of Rand Gold Production.* Ralph Stokes. Gives figures showing the gold output and milling capacity, and suggests that the Robinson will be the greatest gold mine in the

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

In ordering, give date of *The Mining World* in which the article has been mentioned. All orders are payable in advance.

world.—*The Mining World*, Aug. 1, 1908; pp. 11-3; illus.

*The Hardinge Conical Pebble Mill.* H. W. Hardinge. Gives the results of practical work with this unique pebble mill.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 6; illus. 60 cents.

*Mining Camp of Topia State of Durango, Mexico.* T. C. Graham. Describes the history and development of this famous silver-lead district.—*The Mining World*, Aug. 1, 1908; pp. 21-6; illus.

*The South African Tin Deposits.* William R. Rumbold. Describes the Cape Town, Knolls river, Bushveld, Swaziland, Oshoek and Forbes Reef tin deposits.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 7; illus. 60 cents.

*Method of Building a Concrete Coal Bin, Etc.* Ernest McCullough. Gives formulas for calculating the pressure of coal; also the compression and tensile stresses of the walls and bottom of the bin.—*The Mining World*, Aug. 1, 1908; pp. 12-3.

*The Physical Features and Mining Industry of Peru.* George I. Adams. Gives figures showing production, and comments on other economic features that bear on the mining industry.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 10. 60 cents.

*Requirements of a Breathing Apparatus for Use in Mines.* Walter E. Mingramm. Describes particularly the Draeger apparatus.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 10; illus. 60 cents.

*A Discussion of Mine Curve Problems.* J. E. Tiffany. Describes the approved methods of locating curves in coal mines.—*E. & M. J.*, Aug. 1, 1908; pp. 51-7; illus. 20 cents.

*A Laboratory Comparison of Tube Mill Pebbles.* G. H. Stanley. Gives results of experiments to determine the composition, durability, etc., of pebbles used in tube mill practice.—*Jl. Chem. Met. & Mg. Soc. of S. Af.*, June, 1908; pp. 24; illus. 75 cents.

*Effect of Humidity on Mine Explosions.* Carl Scholz. The striking features developed by the writer's investigations are: (1) Explosions occur more frequently in the colder months of the year; the colder the winter the more frequent the explosions. If a certain district has extremely cold weather and other sections of the country are comparatively warm, the latter sections are freer from

explosions. (2) Mining fields located in higher altitudes are more productive of explosions than those at lower elevations. (3) The hygrometric conditions of the atmosphere has the greatest effect upon the cause of explosions.—*Bi-Mon. Bull. A. I. M. E.*, July, 1908; pp. 9. 60 cents.

*The Silver-Lead Mines of Santa Barbara, Mexico.* Claude T. Rice. Describes the method of milling, as well as the geology of the district and its development.—*E. & M. J.*, Aug. 1, 1908; pp. 5; illus. 20 cents.

*Notes on the Stamp Mill Water-Feed and Packed-up Dies, Introducing the Shallow Front Mortar Box.* Harry T. Pitt. Describes experiments made at the Rose Deep mill on the Rand.—*Jl. Chem. Met. & Mg. Soc. of S. Af.*, June, 1908; pp. 34; illus. 75 cents.

*Valuation of Mining Properties.* George H. Gillespie. Continuation of a previous article.—*Can. Mg. Jl.*, Aug. 1, 1908; pp. 14. 35 cents.

*Prospect Drilling.* Otto Ruhl. Describes the practice in the Joplin district, and gives costs of drilling.—*M. & M.*, Aug. 1908; pp. 14; illus. 40 cents.

*Shot Firing by Electricity.* D. Harrington. A description of the method of firing all shots from the surface, used at the mines of the Utah Fuel Co.—*M. & M.*, Aug. 1908; pp. 24; illus. 40 cents.

*Steam Churn Drill in Hot and Cold Climates.* John Power Hutchins. Describes the equipment generally necessary, and gives costs of operating the drill.—*E. & M. J.*, Aug. 1, 1908; pp. 3. illus. 20 cents.

*Coal Mines of Mexico.* Manuel Schwarz. Describes the principal coal mining regions of the republic, gives analysis of the coal and outlines development work done.—*M. & M.*, Aug. 1908; pp. 24; illus. 40 cents.

*A Novel Washing and Leaching Apparatus.* Alfred Gradenwitz. The stirring device described is capable of keeping in constant motion considerable quantities of ore or other material, with a minimum power consumption; it is especially adapted to the separation of gold from amorphous sand in cyaniding.—*E. & M. J.*, Aug. 1, 1908; 600 words; illus. 20 cents.

*Mining and Reduction of Ely Ores.* R. L. Herrick. Describes the geology of the Ely district in Nevada, and the method of mining.—*M. & M.*, August, 1908; pp. 4; illus. 40 cents.

*Tube Mill Crushing.* E. B. Wilson. Describes the use of tube mills for crushing in connection with the cyaniding of slimes.—*M. & M.*, Aug. 1908; pp. 3; illus. 40 cents.

*Steel Triples and Bins.* W. R. Elliott. Outlines the precautions advisable in designing steel triples and bins to insure their preservation at bituminous coal mines, and describes the causes of deterioration.—*M. & M.*, Aug. 1908; pp. 24; illus. 40 cents.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### Deister No. 3 Concentrating Table.

One of the interesting developments in the treatment of slimes is a reciprocating table built by the Deister Concentrator Co., of Fort Wayne, Ind., which is their No. 3 slime table. This machine has been on the market for some time and is in use in various mills throughout the country. Of the many interesting results so far obtained is that resulting from a recent test made by the Goldfield Cons. Mines Co. at the Combination mill, Goldfield, Nevada. A test was run by this company to ascertain the efficacy of the Deister machine inasmuch as 80% of the pulp to be treated in their new mill will pass a 200-mesh screen, and as a result of the tests an installation of 70 tables, comprising the complete table equipment will be made in the new mill. The successful application of the reciprocating

at the front of the machine. These tables are made both right and left hand and when installed in groups make a very substantial and neat appearance.

### What the Name "Albany" Means.

Forty years ago Adam Cook established the Albany Lubricating Compound & Cup Co. in Albany, N. Y., manufacturing "Albany Grease" and specialties in oils and lubricating devices, and now for 17 years the entire manufacture of these products have been solely made by Adam Cook's Sons of New York, the firm being composed of the sons of Adam Cook, the originator of "Albany Grease," and occupying two large buildings at 313 West street and 520 Washington street, New York.

The "Albany" products are adapted to all kinds of machinery in all climates,

to the winding and suitable for holding in metal grips, and of a size to fit into standard fuse holder clips.

**Steam and Oil Separators.** Ohio Blower Co., Cleveland, O. Catalog No. 116. Pp. 79; illustrated.

Is devoted to the Swartout cast iron exhaust head and centrifugal steam and oil separators, made in a number of types. Views of the apparatus are shown, including two exhaust heads of the 36-in. condenser type made for the Utah Copper Co. plant at Garfield, Utah. Views of buildings in which the exhaust heads have been used are given and sectional drawings of the apparatus are shown. The volume includes descriptions of oil separators, steam separators of various types and interesting tables and other useful data.

**Engines.** Bruce - Merian - Abbott Co., Cleveland, O. Catalog A; illustrated.

Tells of the adaptability of vertical gas engines for electric lighting, pumping and general power purposes. The engine is



No. 3 Deister Concentrator.

type of table to the treatment of slimes in this instance is marked by the long and determined effort of Mr. Emil Deister, the inventor of the tables which bears his name, and the popularity which these tables have attained is due very largely to their performances under most exacting conditions.

The form of the Deister No. 3 slimer is practically rectangular and occupies floor space when installed 8 ft. 6 in. by 10 ft. 6 in., and when crated for shipment weighs 1,600 lbs.

The driving mechanism is of the improved Deister rolling contact type which is of simple construction and has separate adjustments for differential action and length of stroke, each being entirely independent of the other. The principal bearings are brass bushed and have ample bearing surfaces. Ample provision is made for setting the table at the desired initial incline, and the general operating adjustment is controlled by a hand wheel

and the trade-mark "Albany" is registered in all countries of the world.

"Albany Grease" can now be had from responsible engine and mill supply houses, hardware, oil and auto supply dealers in every country on the globe.

### Trade Publications.

**Electrical Resistance Units.** The General Electric Co., Schenectady, N. Y. Bulletin 4587; illustrated.

There are several novel features of the new type of resistance unit described in this bulletin. These consist of a length of wire of negligible temperature coefficient wound spirally about an insulating tube and are made in sizes of from 0.1 to 5,000 ohms, carrying continuously from 0.17 to 45 amperes. The unit is made in two forms, one having porcelain bushings at the end with wire terminals, and the other having metal bushings connected

built in two types, one for operating on natural or illuminating gas, and another "or operating on producer gas." It is argued that these engines are especially efficient and economical for medium-sized lighting plants. The engines are of the vertical multiple cylinder type, operating on the 4-stroke cycle principle. The catalog is illustrated with a full view and a cross section view of a 100-hp. engine, and several of the more important parts of the machine are shown and described.

**Surveying Instruments and Drawing Materials.** Isard Warren Co., 1122 Vine street, Philadelphia, Pa. Pp. 227; illustrated.

This is the first complete catalog issued by the company, and fully describes its large line of high-grade precision instruments. Among the novelties offered is a "Midgett" transit, which may be carried in a suitcase; 3/4-in. horizontal circle, 2 1/4-in. vertical circle, weight 6 lbs. It is complete in all appointments, being in-

tended for exploring expeditions and consultations engineering.

**Vertical Engines.** American Blower Co., Detroit, Mich. Catalog No. 232, superseding No. 200. Pp. 64; illustrated.

A number of small high-speed engines of the vertical enclosed self-oiling type are illustrated with full views and sectional drawings, and particular attention is called to the automatic internal lubrication by a pump and gravity flow. Some space is given to the heating and ventilating systems made by the company, as well as exhaust fans, volume and pressure blowers and the company's system of mechanical draft.

**Pumps.** Alberger Pump Co., 95 Liberty street, New York city. Catalog A Pp. 32; illustrated.

Treats of the development and theory of centrifugal pumps and the design and construction of the Alberger volute pumps, which are known as the standard regular two-stage and turbo volute types. Illustrations are given of the standard volute pumps, motor driven and belt driven, and the volute pump, engine driven. The other illustrations include 2-stage volute pumps, centrifugal condensers and the Alberger turbine pumps.

**Valves.** Schutte & Koerting Co., Philadelphia, Pa. Catalog No. 8; illustrated.

Section A shows types of extra heavy hand brace valves with cross sectional views; section B is devoted to stop, check and emergency valves; section C illustrates a number of stop and throttle valves and special globe valves, and section D describes balanced trip and trip throttle valves and balanced stop and throttle valves, some of which are made in the heaviest known sizes. These sections are all arranged so that they can be added to a loose leaf catalog.

**Electrical Appliances.** Fort Wayne Electric Co., Fort Wayne, Ind. Miscellaneous publications; illustrated.

**Construction Book No. 3032,** superseding No. 3024, explains the company's series alternating current arc systems, showing the various attachments and illustrations with diagrams for installing and connecting the system, accompanied by full instructions. A pamphlet treats of fan motors, which are made for desks and with bracket attachments; a folder advocates the company's meter reading books and Bulletin No. 1106 treats of direct current switchboard panels for small plants.

The Burma Oil Co., Rangoon, India, has inaugurated a new pipe-line for transporting oil from the Yenaygaung fields to the pumping station at Pyinbhinla, 25 miles above Prome. About 1,500 tons of oil have been delivered through the pipe-line at Pyinbhinla into flats, which were towed to Rangoon by the Irrawaddy Flotilla Co.'s steamer "Peking." The section is now opened in the northernmost part of the line, which in future will feed Rangoon refineries.

The United States received 350 lbs. of fluorite from Ceylon last year.

## Industrial Notes.

The Bucyrus Co., South Milwaukee, Wis., manufacturer of dredging and excavating machinery, gave its 2,500 employees an outing August 8 at Waukesha beach. Chartered cars carried the party from South Milwaukee.

The Gas Machinery Co., Cleveland, Ohio, announces that it has arranged to manufacture and sell the Wile producer heretofore furnished by the Wile Power Gas Co. J. I. Wile will be sales manager of the new department of the company.

The following officers of the Crocker-Wheeler Co., manufacturers and electrical engineers, of Amper, N. J., were elected at the recent annual meeting of the company: President, S. S. Wheeler; vice-president, Gano Dunn; second vice-president, A. L. Doremus; chief engineer, Gano Dunn; secretary, Kodman Gilder; treasurer, W. L. Brownell; assistant secretary, J. B. Milliker; assistant treasurer, G. W. Bower.

The C. O. Bartlett & Snow Co., Cleveland, Ohio, has received an order through F. C. Greene, Cleveland, O., local mining engineer for the Crow's Nest Pass Coal Co., Fernie, B. C., for a complete steel tipple for the company's Michel mines. The tipple is to have a capacity for handling 6,000 tons coal per eight-hour day. A Greene self-dumping car haul will be installed, as well as other of Mr. Greene's special appliances, together with special machinery manufactured by the Bartlett & Snow Co.

The San Francisco branch house of F. W. Braum will hereafter be operated by the Braum-Kuecht-Heimann Co. The controlling management will rest with K. Kuecht and R. Heimann, who have been associated with Mr. Braum for the past 15 years. The Los Angeles business will continue to be operated under the firm name of F. W. Braum. Geo. B. Crooks and Lee Cochrane, both of whom are well known to the mining trade through their long connection with Mr. Braum, will retain their positions with the new company and are stockholders and directors.

Another result of the progressive policy pursued by the E. I. du Pont de Nemours Powder Co. is the marketing of the new Red Cross dynamite. This is the result of part of the work done by its staff of research experts. By the use of ingredients, which in no way detract from the strength of the explosive, the freezing point of the nitroglycerin is lowered to 35 degrees Fahrenheit. In addition, when the temperature drops below this point, the Red Cross dynamites freeze with extreme slowness. On the other hand, when frozen they can be thawed very easily and quickly.

The increasing use of small Curtis steam turbines is shown by an inspection of a partial list of turbines under 500-kilowatt capacity which have been installed by the General Electric Co. of Schenectady, N. Y., or are under construction. Of the 570-odd turbines listed (total capacity about 37,000 kilowatts) 7 per cent are for export trade. The remainder are for domestic service. It is

interesting to note the widely different industries in which small Curtis steam turbines are used. In the list are wood-working plants, ice plants, textile mills, breweries, tanneries, flour mills, shoe factories, paper mills, foundries, iron and steel mills, distilleries, chemical plants, machine shops, textile mills and ammunition factories. It is also interesting to note that leading railroads are using turbines for train illumination. The latest application of moderate size Curtis turbines is for driving fire pumps. On ships, where a compact generating unit is required, small turbine lighting sets are also coming into favor.

The Success portable fire extinguisher recently placed on the market by the H. W. Johns-Manville Co., 100 Williams street, New York, is made of extra heavy Lake Superior cold-rolled copper, securely riveted and reinforced by heavy shoulders of solder, every one of which is tested to withstand a pressure of 450 lbs. to the square inch, or four times the required strength. The joint where the cover is attached is ordinarily the weakest part, but the method of attaching the dome to the body of the shell is said to make that joint the strongest part in this extinguisher. The large wheel at the top of the machine is a convenience in opening and closing it, at the same time serving as a base on which to rest it when reversed, as in use for playing on a fire. The framework, or bottle holder, containing the supply of sulphuric acid, is cast brass and virtually indestructible. The bottle of standard size and type for holding the acid is obtainable anywhere in case of accidental fracture from any cause. The hose, tested to 400 lbs. to the square inch, cannot be pulled off and is only detachable with a wrench, being joined to the body by a swivel ground joint. The nozzle is said to be absolutely non-corrosive. No mechanical force is needed to put the apparatus in action; it is simply turned bottom up and the resultant mixture of sulphuric acid in the three gallons of water charged with bicarbonate of soda develops instantly force enough to throw a chemical stream 50 ft. This chemical stream acts as a blanket and smotherers fire which water cannot reach. By means of a lead stopper, fitting loosely, the flow of sulphuric acid is regulated and just the correct amount of gas generated at all times, making explosion impossible, the company states. As this extinguisher neutralizes the acid before it leaves the machine, the stream will not injure material with which it may come in contact. This extinguisher is included in the list of approved chemical extinguishers issued by the National Board of Fire Underwriters.

In all the smaller streams and in parts of the larger ones on Seward Peninsula, Alaska, a bed of clay or sandy clay, in which more or less vegetable matter is intermingled, forms the topmost layer. This surface bed, which is called "tundra" by the miners, ranges in thickness from 2 to 30 ft. and appears to be a subaerial accumulation, due in part to the decay of vegetable matter and in part to the deposition of silt during the rainy season.

## Personal.

K. H. Seibel of Chicago is examining mining properties in California.

H. Foster Bain, director of the Illinois Geological Survey, was in Chicago last week.

Richard R. Vail has been appointed superintendent of the East Butte Mining Co., Butte, Mont.

George Otis Smith, director of the United States Geological Survey, was in Chicago last week.

Charles Harrigan has been appointed manager of the Humming Bird mine near Grand Forks, B. C.

E. H. Gregory, manager of the San Carlos Gold Mines, Ltd., has returned to Guadalajara, Mex., from England.

C. F. Lake, manager of the Princess Mining & Milling Co., has returned to Nederland, Colo., from his visit in the east.

T. H. Proske of Denver, Colo., manufacturer of the Ajax drill sharpener, was in Chicago last week on his way to New York.

D. W. Shanks, general manager of the Rio Plata Mining Co., has returned to Chihuahua, Mex., from a visit to New York.

Dwight E. Woodbridge, mining engineer, Duluth, Minn., passed through Chicago last week on his way to Arizona and Mexico.

A. E. Place of Place & Elton, consulting engineers, Oaxaca, Mex., is on a business trip to New York and other eastern cities.

J. P. Empson, metallurgical engineer, has moved his offices from 2a San Francisco 5, to Cinco de Mayo No. 20, office 15, Mexico City.

G. E. Laughlin, general manager of the Alabama-Oaxaca Mining Co., Oaxaca, Mex., is on a short visit to various cities in the United States.

L. D. Ricketts, general manager of the Greene-Cañanea mines, Cananea, Sonora, Mexico, has returned to the properties from his recent Chicago visit.

L. V. Ulrey of Fort Wayne, Ind., president of the Mexican Mines Development Co., recently inspected the company's properties in Sonora, Mexico.

J. E. Spurr has been making an examination of the West End mine, at Tonopah, Nev., for the owners, with a view to planning future development work.

Messrs. Bandmann and Adams, mining engineers, San Francisco, Cal., have dissolved partnership. W. J. Adams is now located at 237 Sansome street, San Francisco.

George McDonald, formerly superintendent of the McKinley-Darragh mine at Cobalt, Ont., but now of British Columbia, is looking over the Montreal River section.

F. A. Woodward, general manager of the National Mining Exploration Co., was in Chicago recently purchasing equipment for the company's property in the Globe district, Arizona. He will visit

New York and Boston before returning to the west.

Messrs. White and Newcomb, engineers and metallurgists, have opened offices in the Bancario de Obras y Bienes Raices building, Avenida Cinco de Mayo, 32 Mexico City.

J. L. Saint-Dizier has succeeded R. J. de Morambert as general manager of the Encinillas Mines & Smelting Works of Santa Rosalia, Santa Rosalia Camargo, Chihuahua, Mexico.

Wm. B. Phillips of Birmingham, Ala., is at Cobalt, Ont., where he has assumed charge of development work for the Big Fissure Mining Co. For the next two months Mr. Phillips' address will be Cobalt hotel, Cobalt, Ont.

George S. Rice, consulting coal mining engineer of the United States Geological Survey, sailed last week for Europe to investigate the methods of mining there, having in view the prevention of waste of coal and the loss of life in mining.

## Obituary.

Frederick S. Harris, who died recently at San Diego, Cal., after a siege of 18 weeks with typhoid fever, was at the time of his death manager for the Kansas City-Goldfield Mining Co., at Goldfield, Nevada. Previous to that he had been associated with mining enterprises in the San Juan region of Colorado and in Mexico. He represented both W. C. Andrews and W. G. Carroll & Co. as mining engineer for many of their enterprises in Mexico and Central America. He was born in Chicago, October 22, 1859, and maintained an office here.

James Duncan Hague, member of the American Institute of Mining Engineers, died at his summer home in Stockbridge, Mass., Aug. 4, of heart disease. He was born at Boston in 1836. His early education was obtained in the Boston public schools, and he afterward attended the Lawrence Scientific School at Haverd; Georgia Augusta University, Göttingen, Germany, and the Royal School of Mines, Freiberg, Saxony. He completed his studies in the last named institution in 1858. In the two following years he was engaged in an exploration of the South Seas, and in 1862-3 he served for a short period in the United States navy. He became the manager of some of the Lake Superior copper mines in 1863 and participated in the early development of the Calumet & Hecla mine. In 1867 he became First Assistant Geologist of the United States Geological Survey of the 19th parallel, and later spent several years in an examination of mines and mineral resources in Nevada and Colorado, and in the preparation of an elaborate report of the survey which was published in 1870 under the title of "Mining Industry." From 1871 to 1878 he resided in California as a consulting mining engineer. In 1878 he went to the Paris Exposition as a United States Commissioner. Afterwards he published a book, entitled "Mining Industries of the Paris Exposition." Since 1879, Mr. Hague has made his headquarters in New

York city, and has been connected with a number of mining enterprises.

## Technical Schools and Societies.

*American Institute of Mining Engineers.*—The ninety-fifth meeting of the institute will be held in Birmingham, Ala., commencing Tuesday evening, Sept. 29. The headquarters will be maintained and the sessions held at the Hotel Hillman. A number of papers of professional importance to mining engineers, economic geologists, and metallurgists, will be delivered at this meeting, and the excursions and other forms of entertainment projected by the local committee promise to be of the highest degree.

The following special excursion to the mining region tributary to Birmingham has been planned:

Saturday, October 3.—Leave Birmingham 5:25 p. m., arrive at Chattanooga 9:15 p. m.

Tuesday, October 6.—Leave Chattanooga 9:25 p. m.

Wednesday, October 7.—Arrive at Ducktown 5:12 a. m.

Thursday, October 8.—Leave Ducktown 9 p. m.

Friday, October 9.—Arrive at Cincinnati 11:48 a. m.; leave Cincinnati 11:55 a. m.; arrive at Pittsburgh 8:04 p. m.; leave Pittsburgh 8:14 p. m.

Saturday, October 10.—Arrive at Philadelphia 8 a. m.; arrive at New York 10:30 a. m.

The foregoing itinerary provides for stops of three days at Chattanooga and two days at Ducktown. In both places the party will receive generous hospitality, expressed not only in social entertainment, but also in local excursions, visits to mines and works, technical sessions, etc., the particulars of which will be announced hereafter. The trip is so arranged that Sunday may be spent at Chattanooga, upon Lookout mountain, and, if desired, in visits to the battlefields and the National cemetery.

*American Electrochemical Society.*—A new class of members has been provided, as shown in the following amendment to the constitution, adopted at the last meeting of the board of directors: Students in high schools, technical schools, colleges or universities, or assistants in technical laboratories, furnishing references of good character from their professors or employers, subject to the approval of the board of directors, may, by the payment of the annual dues, without entrance fee, become affiliated with the American Electrochemical Society as "Junior Associates." They will be printed as such on the roll of the society, will receive the Transactions, monthly bulletin and other notices of the society, may attend meetings, offer papers, take part in discussions of papers, and participate in visits and social functions; but they do not have the right to hold office, vote for officers, or to vote on or discuss business motions brought before the society. Said "Junior Associates" may remain as such not over five years from their first enrollment, and may become members at any time by being regularly elected by the board of directors and paying the entrance fee.



# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ARIZONA.

### Phoenix.

Numerous reports of rich strikes in the Renfro property at Kelvin, Pinal county, have lately been coming in. Numerous tunnels have been run under the mountain on which the Renfro is situated. One is in 300 ft. Several shafts have been sunk, all showing good ore. This property lies in the Dripping Springs wash and but seven miles from Kelvin and the railroad.

The Ray Copper Co., in this district, has several drills at work and will have a number more in operation in a few weeks. All the holes drilled show ore. The average depth has been 350 ft. and from all indications the company has an immense body of low-grade ore. The ores are to be handled on a very large scale and this fall there will be several hundred men at work in the mines and mill.

The Kelvin Copper Co. has announced that it has \$400,000 ready cash in the treasury and that it will begin the erection of a 500-ton concentrator and get things in shape for starting general operations in a few weeks. Ed. Worthington is acting as superintendent during the temporary absence of Superintendent W. B. Twitshell.

J. K. Truman, who has been operating a three years' lease on the Clinch mine, Hassayampa district, Yavapai county, has secured a year's extension of time from its owners. He has a large tonnage of gold ore that can be profitably milled ready for treatment in the mill as soon as a water power is installed. Some of the ore is too low grade to mill with wood, the only fuel available, selling at \$6 a cord. The camp is 14 miles south of Prescott and is reached by wagon road.

Picacho Basin Mining Co. has been organized to operate the Picacho mine and mill at Picacho. The mill, of 1,400 stamps, is to be dismantled and removed four miles to the Colorado river. It will be reconstructed as a cyanide plant and equipped to operate 300 stamps. H. P. Clark of Los Angeles, Cal., will be superintendent in charge.

### Bisbee.

All the crosscuts of the Superior & Pittsburg Co.'s Junction branching off drift No. 3 are in ore and in most instances better ore is being encountered as the new ground is being penetrated. Crosscuts Nos. 17, 21, 22 and 24 are all in ore. No. 17, which is being run along the contact, has already passed through 50 ft. of sulphide ore. No. 21 crosscut has also passed through 50 ft. of the same grade of ore, and Nos. 22 and 23 have passed through 20 and 30 ft. of high-grade ore respectively. In No. 5 raise from No. 22 crosscut 20 ft. of ore has been penetrated. During the past week the Junction has shipped the richest ore ever brought to the surface from this property, four carloads assaying 10%, 14%, 15% and 18% copper respectively.

The Copper Queen Co. is almost finished

electrifying its underground ore-hauling apparatus and in a brief time all their ore will be hauled by electricity.

The Wolverine & Arizona Co. has been busy sinking an incline from the tunnel. It has now reached a depth of 45 ft. No ore has yet been encountered, but indications are very favorable for finding deposits in the immediate neighborhood.

### Jerome.

The United Verde Copper Co. is making plans to open up the big new No. 5 furnace in addition to the old furnaces when operations are resumed. This furnace is the largest ever put in commission in the southwest. It is 4 ft. wide, 20 ft. long and 14 ft. deep. A furnace of the same size is located at Cananea, but the new United Verde furnace will have a larger capacity by reason of added improvements. A new spur of railroad is being surveyed to the United Verde property from Flagstaff and Senator Clark has given assurance that the line will soon be built.

### Kingman.

A great deal of new work and prospecting is being done since the discovery of molybdenite ore in Cedar district. There are miles averaging from 1 to 15 ft. in width, everyone of which carries molybdenite. The mineral occurs with copper, but is easily separated, less than 1/2% of copper remaining in the concentrates.

The shaft on the Treasure Hill mines is now down 150 ft. At this depth a drift has been run 60 ft., which shows ore of a high shipping grade the entire length. This ore is said to average 400 ozs silver to the ton. Nearly a carload of ore is on the dump ready for shipment to the smelter.

## CALIFORNIA.

### San Francisco.

A large deposit of gypsum has been uncovered in the swamp land holdings of Abel Ady near Klamath Falls, and is being developed with a view to establishing a plant for the making of cement, land plaster and building material.

A large acreage of land has been secured through bond and lease by David Cutten and Wm. McWhorter of Eureka, in the Mottole district, southern Humboldt county, for development as an oil field. They are now organizing a company to bore a deep well.

The shaft on the Diamond at Orville has attained a depth of 50 ft. in blue earth, and Manager M. J. Conney has installed a steam hoist with which to continue the sinking.

The discovery of gold quartz is reported at Santa Rosa and Petaluma near the Iverson ranch in the vicinity of Annapolis, in the northwestern part of Sonoma county. Parties are being fitted out at the

two cities named to prospect the country of the alleged find.

### Mokelumne Hill.

The 10-stamp mill on the Eazy Bird property is being overhauled by Superintendent J. B. Sauve and the mine gotten in shape to keep up a steady production. Repairs have been made in the 20-stamp mill on the Hamby property by Manager G. Steckel and additional accommodations are being built for a larger force of miners.

High-grade ore has been encountered in the Deep Gulch mine and a winze is being sunk on the pay shoot which the adit level opened up.

A 20-ft. ledge has been opened up in the Mineral Point mine near Railroad Flat, with 8 ft. of pay ore that carries a good grade of sulphides. W. C. Cook, the owner, will build a concentrating mill.

Drift-gravel mining in the Mokelumne Hill district is being hampered by lack of water, caused by a light winter and dry summer in the high Sierras, but dead work is being vigorously carried on to take advantage to the fullest extent of the expected fall floods. The force of men at the North Star will very likely be increased.

Gangways are being run through the gravel deposit in the Nuner mine.

Crosscutting in the Edmonds mine is being pushed by the Mokelumne Hill Mining & Milling Co. to get an extension of the Boston Cons. channel. Col. Robinson is manager.

### Conterville.

Several claims on the north fork are being developed by George De Salter and Wm. Harris, who also have a bond and lease on the Moonlight quartz mine. They have let a contract for one and one-half mile of ditch and the construction of a wagon road, the latter to permit the hauling in of machinery for a 10-stamp mill.

Sufficient quartz has been blocked out in the Virginia to warrant the starting of the 10-stamp mill. A good grade of quartz is being crushed. J. W. McEwen is manager.

### Mount Bullion.

A 5-stamp mill is being erected on the Mariposa mine. Pitches on the ledge are being portioned out to tributaries and the mine will hereafter be worked on that system. F. T. Maguire is manager.

### Brownsville.

Preliminary work has been started for the reopening of the Eagle mine at Indiana hill, on which already some \$80,000 has been spent in improvement and development. The shaft is now down 200 ft. and an additional 200 ft. will be sunk. A 5-drill air compressor and a dynamo are being installed. The work is under the management of J. J. Casick, who is backed by Warren C. Wilkins, president of the California Mother Lode Mining Co.

Brownsville district is experiencing a

revival because of the rich strike made in the Soland Wonder a couple of months ago. It is probable that all the belt ranging from the R. Clark mine northwards to Forbestown will be brought under development, and also result in the resurrection of Forbestown.

#### Sierra City.

Rich ore is being taken from the Keystone mine and a 10-stamp mill is in operation.

The lower tunnel on the Tightener quartz mine at Alleghany is approaching the ledge which has already yielded \$250,000.

The main tunnel being run for the South Fork and Maple Grove channel is in 5,000 ft. and is expected to soon reach gravel.

#### Angel's Camp.

Another rich strike is reported from the Utica mine. In all it is estimated that approximately \$250,000 was taken out. A few days before this a rich bunch of ore yielding \$200,000 was extracted. Five 40-ton cars of sulphides valued at \$20,000 were recently shipped by the company to the smelter at San Francisco bay. Developments in the lower levels are going forward steadily. The mill is running constantly on good ore and a large force of men is engaged.

The Lightner, Angels, Melones and other properties in this district are working full handed and producing a large tonnage of medium-grade milling ore. Recent discoveries indicate that these mines will show greater values with depth than were encountered in the upper levels. The active operation of these properties on a large scale will do much to place Calaveras county among the leading gold producing counties of California in 1908.

The Golden Era Mining Co. of San Jose has bonded the Blue Bell mine from Mrs. A. J. Palmer. The incline shaft is down 100 ft. with crosscuts showing a good ledge varying from 6 to 20 ft. in width. It is estimated that enough ore is blocked out to keep a 20-stamp mill running four years. The shaft is being sunk to greater depth and two tunnels are being driven to open up the ore bodies disclosed at several points. The mine is located on the south fork of the Mokelumne river, about one and one-half miles from Glencoe.

Arrangements are being made to operate the Mohawk mine, formerly the Keystone, in the Railroad Flat district. The incline shaft is down 200 ft. on a 2-ft. ledge running about \$26 per ton. The property is equipped with a 3-stamp mill.

Some activity is apparent at the Occidental at Glencoe. The shaft is down 40 ft. on a vein running from 12 to 14 ft. in width.

The Illinois mine is showing up well and a large quantity of rich ore was recently taken out.

Lagomarsino & Queirolo have struck a small shoot of rich ore on the Gobbi ranch three miles from Fostoria. Development work is going forward steadily to open up the find at depth.

Arrangements are being made to com-

mence the early installation of a \$100,000 dredger to work the immense deposit of tailings in Chili gulch.

#### Big Pine.

The Santa Rita group of four claims has been taken over by D. H. Duncan of Cripple Creek, Colo., and J. P. Fitting of Big Pine. The principal vein is 18 ins. wide and carries good values. There is a 6-in. streak of very high-grade gold ore. The development is by shafts and drifts.

The Eva Copper mine, owned by Schief and others, has a shaft 400 ft. in depth on ore giving 12% copper.

Adjoining the Eva Copper mine, H. J. Bernard, J. Black, Otis Rutherford and Henry Henry own a group of claims, the ledge of one being 12 ft. in width of a copper oxide ore assaying 7% copper. Three of the claims have ledges of gold-bearing rock with average assay values of \$50 to the ton.

## COLORADO.

#### Denver.

Conditions in the mining field continue to show steady improvement. The volume of ore produced and going out to the smelters and mills is larger and, by more careful sorting, of better grade. Many old mines and prospects are being reopened. A number of mills under construction since last spring are nearing completion and several new ones are projected. The producers believe that the market for copper, lead and silver must soon get back to normal.

There is no evidence of dull times or decreased activity in the gold mines of Gilpin county. The effort being made to induce the management of the Newhouse tunnel to extend it to Central City underneath Gunnell hill promise to be successful. Nearly all owners of mines along its course have signed the contract and the remainder will do so in due time.

Many fine strikes have been made recently. Large bodies of ore have been opened up in the estate of the Fifty Gold Mines Corporation; a phenomenal strike made on the War Dance, much of the ore running about \$1,000 per ton and on the King Bee several promising shoots have been developed.

A considerable number of long idle properties are resuming, incited by the prospect of the Newhouse tunnel being extended to them. The Rollinsville and Perigo in the Phoenix district are quite active.

At Pine creek much development work is under way, notably in the Evergreen mines, where the company's new mill will soon be in commission.

Most of the mills about Black Hawk and in other parts of the county are running on good supplies of material.

Hardy & Co., leasing on the 555 level of the East Notaway in Russell district, have returns from a shipment of 10,750 lbs. of ore, which gave 27.98 ozs. gold, 9.18 ozs. silver and 4.80 per cent copper to the ton, the lot bringing \$2,837.66.

In Boulder county the big electric power

company will add several hundred men to its force within the next 30 days.

Construction work on the 150-ton cyanide plant of the United States Gold corporation will be well under way inside of 60 days.

The 50-ton cyanide mill of the Gold Run Co. will be running during this month.

The Cash mine at Summerville is being unwatered and will give employment to about 50 men.

The Good Luck Co. at Sugar Loaf has commenced work on a 50-ton mill.

The Fortune Dyke at Summerville is being unwatered preparatory to resumption.

The Bailey mill at Eldora is being re-modeled into an up-to-date cyanide plant and a dozen other projects will furnish employment for many new men.

Dr. F. J. Crane's new ore washing and concentrating plant of 250 tons daily capacity being erected at Caribou is being rushed to completion.

In Clear Creek county the Sporting Times on Alpine and Griffith mountains above Georgetown is being developed and will soon become one of the great producers of that district. A streak of high-grade ore from 4 to 6 ins. wide, carrying 2 ozs. gold, 14 ozs. silver and 61% lead, has been exposed. The property is owned by A. H. Colburn of Idaho Springs, who has for the past year been developing it.

An exceedingly rich strike is reported in the Astor mine, operated under lease by Edward Butts & Co. The vein is from 8 to 10 ins. wide. Assay tests show from 900 to 4,000 ozs. silver to the ton, with a fair percentage of lead. The lessees have been working the mine for the last 18 months and making regular monthly shipments. The last ore sent out milled 968 ozs. and 294 ozs. to the ton respectively, according to class.

The Capital Mining & Tunnel Co. is breaking from 125 to 150 tons of ore daily, the greater part being of milling grade. The concentrating plant is treating an average of 125 tons daily. The company will either build a new mill or enlarge the existing facilities under the same roof. The net production is estimated at \$70,000 to \$80,000 per month. This concern is financed by a pool of Pittsburgh, Pa., men, headed by J. Boyd Duff.

A deal is now pending whereby the Lebanon tunnel group of 39 claims and the Everett holdings, all on Republican mountain, are to be purchased and consolidated.

E. M. Mescript of Idaho Springs has let a contract to John G. Roberts to erect and equip a 50-ton concentrator in Daily and Atlantic districts. Mr. Roberts is also building a mill to be placed near the great dump of the Lamarine mine.

#### Cripple Creek.

A big strike has been made on the Trilby mine between the 5th and 6th levels. Where opened the vein is 30 ft. wide, carrying an 18-in. streak filled with sylvanite and free gold. The balance of the vein matter runs from 1 to 1½ ozs. to the ton. On the 12th level the vein of milling grade stuff is 32 ft. wide. The

newly completed 100-ton mill has started up.

Ore carrying 30 ozs. gold to the ton has been opened up by L. W. Cotton, operating on block 212 of the American Eagles on Bull hill. Several sets of lessees are now operating on the Anchoria-Leland, all of them in ore.

The output of the Elkton for July amounted to 1,200 tons, yielding an average of 30. It is stated that there is material enough in sight to warrant the payment of dividends for several years. The largest producing vein is the Henry on the 500 level.

J. Montrie Fim and associates, subleasing on block 217 of the American Eagles have opened a vein 1½ to 2 ft. wide which carries very high values. The bulk of the vein filling gives from 2 to 5 ozs. to the ton.

A test run of 75 tons has been made at the big mill on the Stratton Independence. It was found to carry \$15 per ton average.

The Portland Co. shipped 9,000 tons to its mill in Colorado City last month. The bullion output is about \$200,000 per month. Several new shoots have been exposed in the lower levels. The one opened up on the 1,500 level is from 4 to 5 ft. wide and carries from \$60 to \$100 to the ton. Two of the company's experts have selected a site for the new experimental cyanide plant to be erected at the mine.

Brookshire, Allen & Farris, working block 19 on the Australia of the El Paso Cons. have recovered the lost ore shoot by an upraise from the 300 level. It is 3½ ft. wide and the ore of smelting grade. It is probable that work will in a few days be resumed on the Roanoke.

Ore running up to 10 ozs. gold has been opened by H. J. Anstie, leasing on the E. Porter Gold King on Gold hill.

A vein 2½ to 3½ ft. wide has been exposed in the Flourite on the south slope of Copper mountain.

**Breckenridge.**  
An important find of very rich gold ore has been made in the Keystone group owned by C. L. Westernman. The streak appears to fill a crevice from 5 to 10 ins. wide.

The Wellington Co. has a force of carpenters at work building its new 100-ton concentrator.

The new gold dredge boat being built for the French Gulch Dredging Co. will raise and wash 2,000 cu. yds. of dirt per 24 hours. The boat will work the ground formerly known as the Mikka placer. H. J. Reiling of Denver is president.

The Ware Patch concentrator is running full time on ore from the Patch.

The Old Boss property on Farinokum hill, owned by St. Louis people, is being put in shape for active operation.

It is understood that the Swastika Gold Mining Co., owning the Lucky and adjacent property on Mineral hill, will soon resume. The groups are equipped with two concentrating mills.

It is announced that the Colorado Dredging Co. has purchased or is about to purchase the Blue River Gold Excavating Co.'s placers in the Blue River valley. If the deal is closed another big dredge boat similar to the two costing \$105,000 each now operated by the Colorado Gold

Dredging Co., will be built ready for the opening season next year.

In the eastern end of Summit county between the north and middle forks of Swan river a new mining camp called Goldshoro has been established. The chief operators are building a mill there. The vein filling of the lodes is talc with a porphyritic quartz, carrying sulphides of iron, lead and copper, giving returns from a few dollars to several hundred dollars to the ton.

**Leadville.**  
The Penn mine on Breece hill will produce daily about 225 tons of good ore. There are three sets of lessees, all in paying mineral, and much new ground has been developed in the last few months.

Shipments from the Star mine on lower Carbonate hill are averaging about 30 tons daily.

After two months of work the Belvidere-Leadville tunnel in Horseshoe district has encountered two big streaks of excellent ore from which regular shipments are being made; one in 5 ft. wide and the other 2 ft. Settlements at the smelters gave 10 to 50% lead and 20 to 30 ozs. silver to the ton.

The Hilltop mine in the same section is producing a heavy tonnage of zinc ore.

Strong shipments continue from the Star of the West mine on Iron hill, in which a recent discovery showed exceptional values in lead and silver.

No. 4 shaft of the Ilex mine was closed for repairs Aug. 1, and will remain closed for about three weeks. The three other shafts will be worked as usual.

**Telluride.**  
The two big Smuggler mills, the Tomboy, Liberty Bell and Alla mills are running at full capacity, while parts of the Gold King, Nellie, Suffolk and Carbon concentrators are in operation.

The Silver Chief mill up Bear creek, the Gertrude at Sawpit and the Black Bear are all running and producing large tonnages of concentrates on the average than ever before.

The management of the Carbon mine at Ophir has decided to mill the old dump, estimated to contain about 3,000 tons.

J. C. Ferguson and others have leased the Single Standard mine on Silver mountain near the old Suffolk.

**Montezuma.**  
The Bullion Co., whose application for a patent to 12 claims was opposed by the forest rangers, has won the suit. A new tunnel is about to be started on the property, which it is expected to have finished by the time the railroad reaches there.

A new vein of high grade lead ore has been struck on the Quail group. A wagon road has been completed part way up to the mine.

**IDAHO.**

**Sandpoint.**  
The Marguerite Gold Mining Co. has been under development for 12 years. No. 1 tunnel is in 200 ft., all in ore to the face. The vein is 4 ft. wide and is developed at a depth of 1,000 ft. The ore is free milling and is reported to assay \$12.50 to the ton in gold. No. 2 tunnel is in 300 ft. and is just entering ore. The company

has located a water power right on Trestle creek and is preparing to build a 150-ft. flume, which will give 100 hp. When the power is ready an air compressor will be installed. L. D. Farmin of Sandpoint is president.

Three claims and a mill site located one and one-half miles east of Leonta, on the Great Northern railroad, and owned by Al. Filson, John B. Southmayd, L. D. Farmin, F. H. Molyneux and F. J. McBride, have five parallel leads. One 1½ ft. wide, carrying 2 ft. of solid galena assaying 60% lead and 12 ozs. of silver, the rest of the lead being quartz shot full of galena. On this lead a crew of men is driving a tunnel, already in 70 ft. Three cars of shipping ore is on the dump and about 1,000 tons of concentrating ore. Two of the other leads, parallel with this one, and 300 and 150 ft. distant are 18 ins. thick, over half of which is galena, running about 40% lead and 16 to 20 ozs. silver. About 100 and 150 ft. from these leads are two more, each 5 ft. in width. Showing but little ore, there being only a shot of lead occasionally in the quartz.

The Green Monarch Copper Mining Co. has 11 claims at South Hope, across the bay 20 miles from Sandpoint, developed by seven tunnels aggregating 1,500 ft. in length, all in ore assaying from 2 to 42% copper, with a trace of gold to \$7 to the ton and from 20 to 37 ozs. silver. The depth of working is 1,100 ft. below the apex. A stringer of lead was encountered in the lower tunnel and a ear load of ore is ready for shipment to the smelter. A 10-hp. air compressor is to be installed at once. A small force is at work. The company is incorporated for \$250,000 at \$1 per share. M. Haas of New York is general manager, L. J. Jeannot of Sandpoint is superintendent and L. F. Peckham of Chicago is consulting engineer.

The Panhandle smelter is being rapidly put in shape for the smelting of ore, which T. L. Greenough, one of the heaviest stockholders, states will begin in 30 days. Mr. Greenough has removed his headquarters from Spokane to Sandpoint and has a personal representative constantly on the ground. Roasters and a blast furnace are being installed. Fifty men are at work. The plant will handle both lead and copper ore, drawing its supply from the Coeur d'Alene and Montana.

Returns on a carload of silver-lead ore sent to the Tacoma smelter from the Bluebird mine show a net profit of \$5,400. The mine is well developed and has been worked for several years and a good supply of ore is now on the dump awaiting shipment.

**Harvard.**  
The Mountain Gulch Mining Co. has bought a new ore crusher and will install a new 20-ton Card concentrating table at its property near here, which is now equipped with a small stamp and Huntington mill. The ore is gold, about 30% of which is free milling. The property is being worked.

Randall H. Kemp and John Hotelling have located a group of quartz claims which cover the source of the float that has made the Hoodoo district a well known placer camp for 35 years. They

have surface showings for 300 ft. along the ridges at the head of several creeks emptying into the North Palouse river and some good samples of gold have been taken from the ledge. The property will be equipped and operated this fall and winter. Mr. Kemp has also located several placer claims along the North Palouse below the old workings where there are rich deposits. Two men have been put to work on the property.

The Mirzap Copper Mining Co. is developing its ore bodies through the old workings where an upraise is being made through cuprite and malachite ore. The property will be ready for shipments in a short time.

#### Wallace.

Galena ore of medium grade has been struck in a shaft being sunk from the floor of a tunnel on the Temple property near Birke. The shaft is being sunk to determine the position of the ledge, after which a crosscut will be run at depth.

A rich strike of galena recently made is being developed on the Cooney property near Burke.

The Surprise Mining Co., whose properties are near Kellogg, has levied an assessment of 2½ mills for development work.

Development work on the Alice mine near Mullan, which has been actively carried on for some time, has resulted in striking high-grade galena on the 500-ft. level. The property has been worked for over 10 years and has had thousands expended in development.

Work in the shaft of the Full Moon property continues to show high-grade carbonate ores. Plans are being made to install machinery for driving a long tunnel, which will be begun as soon as preparations are completed.

The discovery of copper ore is reported on the East Snowstorm mine on Snowstorm mountain in an 800-ft. tunnel. The tunnel taps the lead at great depth. Mineral has been in evidence for some time.

After a shut down of several months, preparations are being made to resume operations at the Snowshoe mine.

The Shoshone Mining Co. has levied an assessment the proceeds of which are to be used in extending the tunnel on the property on Nine Mile creek.

The Schultz Mining Co. has been organized here to operate a group of seven claims adjoining the Bullion on the west. The claims are said to be traversed by a ledge of iron 4 ft. wide, carrying lead and silver. Open cuts have been made for a distance of 1,000 ft., all of which give strong indications of values. A 400-ft. tunnel is being driven.

Responding to an appeal of many mine owners of the Coeur d'Alene, the county commissioners have reduced the taxes on a number of mining properties, including some of the largest and oldest ones in the camp. The companies affected are the Federal Mining & Smelting Co., the Bunker Hill & Sullivan Co., the Hercules Mining Co., the Frisco Mining Co., the Hecla Mining Co. and the Gold Hunter Mining Co. No other reductions were made in the valuations of other properties.

The Mineral Farm Mining Co. is driving a tunnel to crosscut the lead on the

eastern side of the hill at a depth of over 700 ft. A working shaft will be sunk from a point within after the ore has been tapped.

#### Mullan.

Chalcopyrite has been encountered at a depth of 865 ft. in a drift being run on the Advance property near here. Similar ore has been present for several days. It is found either side of a tale seam in the center of the drift. The drift has now been run 250 ft. and the lead is estimated to be 60 ft. wide in its face.

The Sonora Mining Co. is now working in milling ore which is improving as the work progresses. Drifting has been carried 70 ft. from the crosscut. An assessment of 2½ mills has been levied, the proceeds to go towards development.

The Independent Copper Mining Co. has decided to resume operations about the first of September, and will work one machine with power from the Missoula plant in driving a drift west on the vein. This property has ore similar to the Snowstorm.

Two hundred thousand dollars has been provided to complete the improvements on the Panhandle smelter at Ponderay, and C. C. Titus, general superintendent, is assembling the crew preparatory to a resumption of work. It is given out by S. W. Gebro, a prominent coal operator of Montana, who is interested in the proposition under the new management, that the plant will be put into operation as soon as ready. Mr. Gebro personally deposited \$50,000, which is to constitute a building fund available at once, and enough has been guaranteed by others to bring the total amount available for a year up to \$200,000. There is much work in the way of enlarging and preparing for ore yet to be finished.

## LAKE SUPERIOR.

### COPPER.

#### Houghton, Mich.

The work of sinking the No. 2 shaft of the Ojibway below the first level at 350 ft. has been resumed. A depth of over 200 ft. has been gained, but no crosscut has yet been run to the lode. It is expected that both shafts will crosscut the lode at a depth of about 500 ft. Considerable copper has been met in a narrow formation in No. 1 shaft. The north and south drifts from the first level of No. 2 shaft in 60 and 80 ft. respectively, are in good copper ground.

Diamond drill exploration work is being pushed on the Mass property. A drill will be placed at the fifth level of shaft A to drill south through the ground between the Adventure and Evergreen properties. Drilling from the surface in the territory traversed by the Calico amygdaloid and Minnesota conglomerate lodes is now being carried on and will be continued. The drilling operations will explore much virgin country.

Work is progressing at the Lake property. The shaft is now down 250 ft. and the south drift at the 160 level is in 154 ft. The ground opened by both these openings is showing up well in richness. For the first 50 ft. the south drift was

carried at a width of 12 ft., then expanded to 20 ft. for the next 50 ft. and reduced to 7 ft. for the last 50 ft. In the widest portion of the drift the foot wall was not encountered, the drift being kept close to the hanging wall. On the surface a trench is being opened across the conglomerate formation and has exposed it for a width of about 150 ft.

An air line has been extended to the Pontiac shaft of the Quincy and power drills can now be used. The shaft was only recently started in rock. A hoisting engine and all necessary equipment for continuing uninterrupted sinking have been installed. Copper rock of milling grade has shown in the shaft from the start. Diamond drill prospecting has made satisfactory showings. There is much milling ore on the old dumps which were accumulated years ago. The north drift from the Mesnard shaft is in 2,000 ft. and in another 800 ft. will connect with the Pontiac. The breast of this drift is in good copper bearing ground.

### IRON.

#### Marquette, Mich.

While mining work is being prosecuted much less vigorously this season than last year, a tremendous amount of stripping is in progress on the Mesabi range. A number of pits that are already producers are being enlarged.

In the district adjacent to Hibbing and Chisholm the work of uncovering ore deposits is especially vigorous. It is being carried on at Virginia, Eveleth, Mountain Iron, McKinley, Nashauk and other points as well. Working forces materially larger than ever before employed in the district are engaged at the Steel Corporation's immense operations in the territory adjacent to Coleraine, where the new Hill mine on state land is being opened, which is estimated to contain as much as 400,000,000 tons of ore. This means a revenue in sight for the state of some \$10,000,000 on a royalty of 25 cents a ton for all the ore taken out. The Hill is one of the properties the leases of which were transferred from the Great Northern interests to the Steel Corporation, and in accordance with the contract the ore is to be taken out over J. J. Hill's railroad, which is being prepared to give the new mine shipping facilities by the construction of a 6-mile extension from Nashauk.

The old Pioneer property out from Michigan, Marquette range, is being tested with the diamond drill. On whose account the work is being done is not known. The ore indications are good.

The Ashtand Iron & Steel Co., subsidiary to the Lake Superior Iron & Chemical Co., is erecting a new shaft-house at its Yale mine on the Gogebic range. The Ashtand furnace of the company has been inactive since the suspension of operations some two months ago. The time when it will go into blast again is indefinite, depending altogether upon the state of the pig iron market.

One of the most important stripping jobs on the Mesabi is that at the Steel Corporation's Sellers property at Hibbing. It was started nearly two years ago and already a large pit has been excavated.

The old shaft has been dismantled and 30 houses are being taken from ground overlying the ore deposit. With the stripping completed the Sellers pit will extend along the east and north sides of Hibbing, and when connected with the Burt-Poole there will be formed an open cut two miles long.

The various stripping operations are resulting in remarkable changes in the Topography of the district immediately adjacent to Hibbing. Already the Sellers pit is within two blocks of the post office. The ore deposit extends southerly into the town for blocks and eventually its stripping will be undertaken.

The Susehanna mine with an overburden of 100 to 125 ft. is to be stripped, and it is probable that the Webb will also be changed from an underground mine to an open pit.

West of Hibbing, the Mahoning mine and the Steel Corporation's Hull-Rust are being brought closer to town. This latter property, containing as it does the largest known ore deposit on the globe, is being developed on a scale commensurate with its importance. Half a dozen steam shovels are engaged in the stripping. Stripping work continues at the Morris, as it does at various other mines.

The Steel Corporation is preparing to strip the surface of the town of Sparta in order to mine the ore that lies beneath. A considerable portion of Sparta's population will settle at the new Gilbert location to the northeast, where one of the largest ore deposits on the Mesabi range is located, and is being developed by the Steel Corporation on an extensive scale. The Gilbert will be mined both by the underground method and as an open pit. Two well equipped steel shafts have been sunk and large excavations have already been made. Five hundred men are employed.

The new "C" Ludington shaft, started something over five years ago, has now gone into commission at the Steel Corporation's Chapin mine at Iron Mountain, Menominee range. The shaft is sunk vertically to a depth of 1,500 ft. It has four compartments, is 24½ by 10½ ft. in inside dimensions and is practically fire proof. It is lined with steel throughout and is surrounded by a steel shaft house. The shaft is connected with the old workings at the 10th and 14th levels. The latter will eventually become the main working level. It is proposed to drain the bulk of the water of the mine into the new shaft, whence it will be hoisted to surface by the giant Cornish pump in commission years ago at "D" Chapin shaft. This pump is a steep compound engine of the crank and fly-wheel type, and has a capacity of 3,000 gals. a minute from a depth of 1,500 ft. It was built at the Allis shops at Milwaukee some 20 years ago. The height of the pump from the top of the foundation is 54 ft. The hoisting engine is of the latest type and is capable of lifting a load of 11 tons from a depth of 3,000 ft.

After having had a monopoly of the ore traffic of the eastern end of the Menominee range ever since the mines at Norway and Vulcan were opened, the Chicago & Northwestern railroad is now sharing the business with the Chicago, Milwaukee & St. Paul Co., which has extended its service to the Steel Corporation's Aragon

property and the Cambria Steel Co.'s Penn group of mines. The extension of its service to Norway is not the only aggressive move planned by the Chicago, Milwaukee & St. Paul Co. It is the intention of this road to also build to Lovetto, five miles east of Norway, and at the west end of the range to invade the Iron River district. This accomplished, all portions of the Menominee range will be tapped by this road with the exception of the Florence field, in which there is only a single producer.

Ore running 57% iron has been found at the property which the Jones furnace interests of Iron Mountain are exploring two miles east of Randville. The deposit was cut at a depth of 70 ft., and it appears to be of large dimensions. A blanket of lean ore overlies it.

The Huron Iron Mining Co.'s new Groveland property, north of Iron Mountain, has recently started shipments. A second shaft has been sunk 200 ft. and is connected with No. 1 shaft at the second and third levels. The ore at the Groveland is not of particularly good grade, but it exists in considerable quantity and the mine is looking well.

The latest properties being developed by the Cleveland Cliffs Iron Co. in the Swaney district are the Kidder forty and a tract near Johnson lake. The overburden of sand is heavy at the Kidder, and a concrete shaft is to be sunk by the air-lock method, as was done at the new Smith mine adjoining on the west. A railroad spur to both the Kidder and Johnson lake tracts is in progress of construction for the Chicago & Northwestern Co. M. J. Peppard & Co., contractors of Minneapolis, are doing the work, which is expected to be completed in October.

Adjoining the Kidder is a tract owned by the Steel Corporation which also contains ore and will eventually be developed. Other mines in the field are the Stegmiller of the Steel Corporation and the Austin, Smith, Stephenson and the two Princetons of the Cleveland Cliffs Iron Co.

It has been recently stated that the Cleveland Cliffs Iron Co. was to extend its activities to the Menominee range, a district in which it has never operated. It appears now that its operations will be on a more pretentious scale than was first thought. Following an inspection of various Iron county lands by the company's geologists, it is understood that a considerable number of tracts are being taken over at the western end of the range and will be thoroughly and systematically tested.

In the same portion of the Menominee fields, Corrigan, McKinney & Co. of Cleveland have recently acquired leases on the Blair and Michaels properties. These tracts have been explored by diamond drills and the results of the work are believed to be satisfactory. Ore has been found, it is known, and much of it lies deep. The properties will be given railroad facilities next year.

The Hollister mine, which M. A. Hanna & Co. of Cleveland are opening in the Crystal Falls field, has been given additional pumping capacity, and increased attention is now being directed to mining work.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week ending Aug. 8 and for the year to that date were as below in pounds:

### LEAD ORE SHIPMENTS.

Camps.	Week Aug. 8.	Jan. 1- Aug. 8.
Alta-Neck City .....	690	188,390
Aurora .....	5,570	219,990
Badger-Peacock .....	.....	851,920
Carl Junction .....	1,740	131,090
Carthage .....	.....	6,170
Cave Springs .....	.....	11,220
Duenweg .....	1,650	2,512,500
Galena .....	66,120	4,168,480
Granby .....	29,854	1,025,740
Joplin .....	303,100	8,909,030
Miami .....	56,600	973,090
Oronogo .....	.....	391,560
Peoria .....	.....	1,930
Prosperity .....	96,010	2,689,380
Quincy-Baxter .....	4,170	645,220
Seneca .....	.....	154,540
Springfield .....	.....	37,020
Spurgeon-Spring City .....	18,210	1,066,540
Webb City-Centerville .....	984,210	23,261,467
Zincite-Sherwood .....	2,520	138,140
Total .....	1,672,046	47,384,677
Value .....	\$50,925	\$1,295,526

### ZINC ORE SHIPMENTS.

Camps.	Week Aug. 8.	Jan. 1- Aug. 8.
Alta-Neck City .....	1,010,350	14,878,110
Aurora .....	282,590	3,930,740
Badger-Peacock .....	537,400	13,223,560
Carl Junction .....	164,220	1,317,720
Carthage .....	415,230	4,884,060
Cave Springs .....	.....	900,780
Duenweg .....	235,110	17,940,370
Galena .....	1,309,890	2,232,990
Granby .....	307,510	12,321,120
Joplin .....	2,589,870	62,560,990
Miami .....	582,520	2,168,328
Oronogo .....	536,900	10,696,900
Peoria .....	.....	414,660
Prosperity .....	758,627	9,519,772
Quincy-Baxter .....	.....	2,248,970
Reeds .....	.....	171,810
Seneca .....	142,160	2,712,240
Springfield .....	.....	84,670
Spurgeon-Spring City .....	302,880	6,768,690
Webb City-Centerville .....	185,960	1,185,360
Wentworth .....	186,916	86,117,323
Zincite-Sherwood .....	221,390	831,570
Total .....	12,924,463	296,651,124
Value .....	\$19,244	\$4,967,069

Joplin, Mo.

Further development work is being done by the Argosy Mining Co. on the McGowan land at Spring City. The present ore level is 112 ft., but drifting is directed toward two drill holes over 85 ft. from the present ore face. The ore now taken out is a high-grade lead and zinc. The mill will be remodeled and its capacity increased. A large air compressor and boiler have been recently added to the power equipment.

A number of companies have been drilling the Bathe land and some of the best strikes of the past few months have been made here.

The rich Midnight mine in the Bellville camp west of the city is to be reopened at once. The shaft of this property penetrates an old cave whose sides are richly covered with lead and zinc. Drill holes also show that the whole lease is underlain with excellent ore. The 150-ton plant is of galvanized iron and complete in its equipment. The property has been closed some months.

The new 100-ton mill on the Massaw land at Granby began operations last week. The tailing pile assays 1%, showing that the mill cleans the dirt unusually well. The mill belongs to the Goode Bros.

The Lucky May Mining Co. has filed articles of incorporation at Joplin with a capital stock of \$50,000. The members

are Messrs. Taylor, Arnold and Bond, Blanche Forsythe and Winifred Blake.

#### Aurora, Mo.

An important strike of lead ore was made in the Aurora camp east of the city by the three Murphy brothers. A lease was taken on a few lots of the United Zinc Co.'s ground and a shaft put down to 25 ft. when a run of lead was encountered, the ore varying from pieces the size of a large bucket to fine particles. No drifting has as yet been done and the extent of the deposit is unknown. Stratton & Co. bought the shaft and lot while the Murphy brothers retained a few lots upon which they will sink a second shaft.

The strike on this land has inaugurated a prospective campaign on adjoining tracts. Seven leases were taken within a few days and seven new shafts are now being sunk.

Scott & Coleman are developing on 240 acres of the Tocker land east of town. A rich run of zinc-blende was encountered at 250 ft. Some time ago a shaft was started and reached the 160 level when it was filled with water by the spring rains. Work was temporarily abandoned, but has been taken up again and heavier machinery installed.

A good strike has been made at Wentworth near the old Gobbler mine by A. Bowers. Five drill holes were sunk on the Smith land and good ore found in each at 65 ft. The ore continued to more than 100 ft.

#### Webb City, Mo.

The McConey plant in the Webb City camp is to be started in operation again after a shut down of a few weeks. The mill has a capacity of 75 tons.

A lease has been taken on the Glass Mining plant by Fen Clark and John Durby of Carthage and the mine will henceforth be called the Overlander. The mill is of 250 tons capacity. New drifts will be run at the 160 level. The shallower depths have been worked but richer deposits are found lower.

The Engineers' Zinc Co. of Webb City is to resume operation as soon as some additional machinery can be installed.

A. M. Wagner and associates have leased the old Mount Claire mine at Alba and will reopen it at once. The property consists of a 6-acre lease of the Aylor land and a 100-ton mill. The plant will be remodeled and made ready to handle the rich tailing pile as well as the dirt mined. The deposit is found at the 300 level where new drifts will be driven.

#### Galena, Kas.

Lynch and Williams have developed a mine within the city limits near the Century hotel. The company holds leases from three different companies, but is taking all the ore out through one shaft. The ground is very soft and requires heavy timbering. Both lead and zinc are found, the drift running 10 to 15% zinc in parts and in others 5 to 50% lead. The ore is found at 130 ft. and carries an 8 to 12-ft. face.

A rich zinc strike has been made on land north of Galena by Ping and Robertson. Each owns a 40-acre lease and the same general run of ore has been found in the four drill holes upon both leases.

The deposit occurs at from 224 to 300 ft. with a few thin barren strata. The dirt assays 12 to 15% zinc.

The Wyandotte Mining Co. has cut the royalty from 20% on zinc ore and 25% on lead ore to 15% straight on each ore. The effect of the lower royalty is noticeable in the rush for leases.

#### Baxter Springs, Kas.

Several companies are planning an early reopening of their properties. The Newlands mill will begin operation the first of next month.

The mill of the Myrtle mine has been started. Recent development in the mine has uncovered the main ore body, which is 18 ft. thick.

A new derrick and ore chute have been installed at the Luther mine which gives additional room for dumping the ore. As soon as sufficient ground is opened up a mill will be built.

The Joanna mill has been purchased by the Good Luck Co. and will be moved to the new property at once.

The mill of the Eastman Investment Co. is now operating on the tailing pile which was milled before the installation of the present sizing system now used in this plant. A saving of 1 to 2% is now effected by the sizing method.

## MONTANA.

#### Butte.

When operations at the Boston & Montana smelter are resumed about Sept. 1, the Washoe at Anaconda will be considerably relieved, as it has for some time been crowded beyond its normal capacity. The Boston & Montana Co., which is confining its mining operations at present to the East Colusa, Leonard and West Colusa, is shipping about 1,800 tons of ore to the Washoe daily. The gas conditions arising from the fire in the old stopes have greatly improved in those mines and work has been resumed in many of the old stopes. The fight with the fire there is still going on. The fire itself is practically dormant, but the trouble arises from the fact that the ground is constantly sinking, which opens cracks and permits the escape of gas into the levels.

The Boston & Montana Co. has stopped work on the Greenleaf mine, on the east side of the district, but may take it up again when conditions are better. The Greenleaf shaft is 1,000 ft. deep. About 800 ft. of drifting and crosscutting has been done, but the results have not been sufficiently encouraging to justify a continuance of development work at this time. The company has resumed sinking on the Badger State, the property adjoining the Jessie mine of the North Butte. The shaft was sunk 560 ft. last year, but work was stopped at the time of general suspension of work by the company. It is not yet decided how deep the shaft will be sunk, but stations will be cut each 200 ft. and crosscutting will be done later.

The Parrot Mining Co. has started sinking the Little Mina shaft from the 1,000 to the 1,200 level, which will give 200 ft. of additional stoping ground. In the Parrot mine the crosscut on the 2,100 level is the only development work being

done. It is expected that the vein will be reached in about a month.

The Trenton Co. is sinking the Gagnon shaft from the 2,100 to the 2,300 level which it is now approaching. As soon as finished to that depth and the station is cut a crosscut will be run and the vein opened at that depth, giving 200 ft. of new stoping ground.

All of the mines of the Anaconda Co., with the exception of the St. Lawrence, are being operated normally. Owing to the gas conditions in some of the workings of the St. Lawrence that mine is worked to only about 50 to 60% of the normal. The Anaconda Co. is shipping about 3,600 tons of ore to the Washoe daily.

While crosscutting from a fault on the 800 level of the Lexington mine by the La France Co. a good vein of copper ore was intersected recently. The opening has penetrated the vein about 15 ft., showing good ore all the way. Assays at high as 8 to 20% copper, 8 oz. in silver and \$2 in gold to the ton have been obtained. The crosscut entered the vein through the foot wall. The discovery was made about 220 ft. southwest from the shaft. It is claimed that there is no zinc in the ore, that refractory metal having disappeared from the vein at a depth of 600 ft.

The Butte & Balaklava Copper Mining Co.'s stockholders, at a meeting held recently, voted to pool the stock. The purpose of the arrangement is not quite apparent. Development work has been carried on for a year, but with no important results. It is claimed that 127,637 shares out of 210,000 outstanding have been pledged to the pooling agreement, or 22,630 more than a majority. The trustees authorized the issuance of trustee certificates to shareholders in place of the stock certificates, which will be negotiable on the market in the same manner as the actual stock, the only restriction being in the fact that the trustee certificates will carry no voting power, the latter remaining with the trustees for the purpose of retaining control of the management of the company.

Several large reserve dams have been built on the British-Butte ground and preparations are being made to install the big dredge which is being built by Risdon Iron Works in San Francisco. The dams have a combined capacity of about 10,000,000 gals. of water in reserve for dredging purposes. It is expected that the plant will be in operation by October 1.

#### Helena.

The report of T. B. Miller, assayer in charge of the Helena assay office, has just been completed for the month of July and as compared with the same month of a year ago shows a substantial increase in the output of gold. The total amount of precious metals received during July of this year was \$292,321.09, while last year the total for July was \$113,356.46. The gold received during the past month amounts to \$181,022.50, while for a year ago the amount was \$103,274.02. Lewis and Clark county also shows an increase in output of precious metals for the month in 1908 as compared with July, 1907. Madison county has the largest

output. Fergus county is second, and Chouteau takes third place.

A strike of considerable importance has been made on the property of the Mutual Mining & Milling Co. at the head of Jefferson, Madison and McClellan gulches. The vein which is of a blankety character contains a pay streak about 11 ins. wide giving average assays of \$100 to the ton, including \$2 in silver.

The Tenderfoot Mining Co., which owns nine claims and a mill site in Meagher county 50 miles northwest of White Sulphur Springs, is developing the properties as a group. Shafts, tunnels and cuts have been made on the leads and good ore has always been found. The mines are being worked by tunnels running lengthwise along the leads. The ore bodies will be opened up without delay to such an extent as to necessitate a concentrator, when its erection will be begun.

#### MISCELLANEOUS CAMPS.

**Salitoe.**—An important strike is reported to have been made in the De Borgia mine near here. Rich copper ore was encountered in a crosscut tunnel which has cut two ledges about 18 ft. apart, both of which carry gold copper ore. The ore body is said to be over 6 ft. wide and to assay over 35% copper. William Meland is president of the company.

**Goodrich Gulch.**—The American Goldfield Co. was obliged to suspend operations at its placer property in Goodrich gulch owing to shortage of water. The season's clean up has been reported as satisfactory. This fall the company will build a large reservoir in addition to the small ones used this year and next spring will work the property on a larger scale. Frank C. Lavigne is superintendent.

**Dillon.**—At a meeting of the stockholders of the Argenta-Dillon Mining Co. held at Dillon during the last week of July it was decided to put from 50,000 to 100,000 shares of treasury stock on the market at 5 cents to raise money for further development. A contract will be let to sink the shaft another 100 ft. this summer, which will make a total depth of 265 ft. This depth, it is expected, will give considerable ore for stoping. A crosscut will be run at the 200 level, where there is some good concentrating ore.

## NEVADA.

#### Goldfield.

The C. O. D. Cons. Mines Co., the merger of the C. O. D., Gold Bar and the Victor claim of the Goldfield Cons. Mines Co., is doing systematic development work to determine the depth of the ore bodies found at and near the surface. Very few leases are being let.

A body of high-grade ore has been opened on the 225 level of the Cons. Red Top lease on the Red Top ground. The principal values are in gold, but there is a little silver and copper. An initial shipment of 12 tons of ore has been made. Exploration work now being done in the south drift shows steadily increasing values. The main shaft on the Cons. Red Top is down 315 ft. and is to be deep-

ened to cut the vein on a lower level. J. P. Loftus is president. The property is being managed by John Donnellan & Co.

The development of a large body of gold ore is reported from the Sphinx mine on Round mountain. The vein has been crosscut for 100 ft. at a depth of 160 ft. Most of the vein matter runs from \$8 to \$15 in gold, but that on the hanging wall runs from \$30 to \$45. The property is controlled by W. H. Clark. John L. Webber is superintendent.

Work has been begun on the construction of the Goldfield Cons. Co.'s new mill. The big derrick for handling the structural steel frame work has been put in position. The large steel tanks are being installed and other portions of the equipment are being set on their foundations.

The new hoist at the main shaft on the Mohawk ground of the Goldfield Cons. Co. is now in operation. The hoist is one of the largest in the camp. At present it is being driven by compressed air as there is more power than is required for the drills now in operation.

The Florence Cons. Co. is developing a promising quartz ledge on the 176 level. The ledge is 4 ft. wide and assays as high as \$35.00 to the ton in gold.

#### Ely.

The Steptoe smelter at McGill has been running steadily and no changes in the equipment have been necessary. The production of copper has increased to about 25,000 lbs. daily. Three converters are in commission, operated alternately on three shifts, and others are being made ready as fast as possible. Shortage of material has caused some delay in the work on the concentrator, but the first half of the second unit has gone into commission and the second half will soon be ready. The mill was treating about 1,300 tons daily previous to the starting up of the first half of the second unit. It is said that, as soon as the first three units are completed, work will be begun on the erection of two more units.

The mines are now in shape to deliver ore as fast as called for. Twenty cars daily are being loaded at the Copper Flat mine of the Nevada Cons. by one shovel in three hours. The tonnage from this mine could be increased to 200 tons daily on demand. About 10 cars daily come from the Veteran.

The shaft of the Boston-Ely has attained a depth of over 700 ft. It is still in leached ground. A drift is being run from the bottom of the shaft on a 20-ft. vein in the direction of the Veteran ground. The vein carries from 30 to 40% iron. Carbonates of copper are occasionally found and it is expected that ore will be found when the shaft has penetrated leached zone. Most of the company's work at present is confined to the shaft and a drift. The shaft is located midway between two parallel veins which will be worked through it.

The Boston-Ely Co. has recently acquired the Matilda and Matilda extension claims from the Ely Western Co. These claims are said to have the richest known gold lodes in the district.

#### Round Mountain.

The new gallows frame and Fairbanks-

Morse gasoline hoist for Matty, Maugh and associates have arrived and are being transported over Round mountain to their lease. The concrete foundation for the engine is being built. The shaft is being timbered its entire length. No work is now being done in the shaft, but as soon as the hoist is ready for operation three shifts will be put on and sinking continued to a depth of between 250 and 300 ft., where the ore body is known to exist. The present depth of the shaft is 110 ft.

Two sets of leasers are at work on the Mariposa claim on the north slope of Stebbins hill. This claim is now controlled by the Round Mountain Mining Co. Fred Tarbell and John Mullen are sinking an incline shaft now down 40 ft. following the ledge. The ore shows good paintings of free gold and the average value of the ore body is said to be from \$25 to \$30 to the ton. One hundred feet from this shaft Lawrence Morrin is also sinking an incline shaft, under much the same conditions as exist in that of Tarbell and Mullen. Morrin's shaft is down 12 ft. and four tons of good ore have been taken out. Both leases are for one year on blocks 280 ft. square.

#### MISCELLANEOUS CAMPS.

**Eureka.**—S. M. Chord and R. H. Locke of the Eureka Mining & Leasing Co., operating a lease on the Windfall group about six miles south of Eureka recently made an initial shipment of 26 tons of ore to the Utah smelters. There is a high-grade streak from 6 ins. to 2½ ft. wide. There is also a low-grade quartz that is said to average from \$16 to \$24 to the ton in gold. Equipment is being purchased for a 20-ton cyanide plant to treat this low-grade ore. The force at the mine has been increased and development of the high-grade ore body will be pushed.

**Elko.**—The Delmas Copper Co.'s property in Elko county, at the head of Lee canyon, on the Diamond range of mountains, is being worked by tunnels from both sides of the range. The present development work is all on the south range. Some high-grade copper-silver ore bodies are exposed in these tunnels. There is a solid ledge of more than 4 ft. of smelting ore, which is said to assay better than 15% copper and 40 ozs. in silver. There is a series of tunnels, one above the other, for more than 1,000 ft., the lower tunnel giving 700 ft. of stoping ground. The officials of the company are all Salt Lake city business men. The company is now installing a 5-drill gasoline air compressor.

**Cherry Creek.**—The new stamp mill on the Cocomogone property of the Stuart Gold Mines Holding Co., five miles from here, was recently started up. The mill is equipped with four Nissen stamps having a capacity of 40 tons in 24 hours and other necessary apparatus for the treatment of gold ores. The mill is to be operated on custom ores and ores from the company's properties in Egan canyon, where a large amount of ore is blocked out. The equipment was furnished by the Fairbanks-Morse Machinery Co. of Salt Lake city.

## OREGON.

## Grant's Pass.

The extensive copper-gold deposits of the Pickett Creek district on Rogue river some 14 miles below Grant's Pass are to be fully developed and shaped for mining and smelting operations by the United Copper-Gold Mines Co. Though the officers of this company are principally southern Oregon mining men, the bulk of the capital will be supplied by Seattle investors. The Pickett Creek copper mines have been under development for several years, but the men who have had them in charge were not able to give them the attention their size and richness warranted. The new company will at once begin driving the tunnels deeper to open up the ore body. Considerable ore has already been shipped from these mines and the returns prove the ledges of exceptional value. O. S. Blanchard of Grant's Pass is president of the new company and O. A. Thomas, who has had charge of the mines for the past three years, is secretary and manager. Assays made on the ore from the Pickett Creek mines give returns of \$30 to \$100 to the ton in gold and from 6 to 8% copper. The ledges are from 5 to 16 ft. in width. The ore is about the same character as that of the Waldo mines where the Takilma smelter is located.

Pickett creek has been mined for several years for its placer gold, some of the richest surface diggings of southern Oregon being located there. It has been known for several years that there were rich ledges in the hills, but not until recently was any effort made to develop the quartz veins. There is much activity in the district this summer and a number of claims have been located. G. B. Glover and G. L. Smith, who are developing a group of claims adjoining the properties of the United Copper-Gold Co., have uncovered a rich body of ore, the values running from \$25 to \$200 to the ton, besides the copper.

The big hydraulic placer mines on Paradise and Half Moon bars of lower Rogue river, which have been under development for the past year, are now fully equipped and ready for operation. As soon as the fall rains bring the water of Mule creek and other supplying streams to a sufficient level, the giants will be turned on and operations begin. Two placer mines were developed and equipped in this district last year and the results from the past season's mining were highly satisfactory. Los Angeles, Cal., capital is behind the several enterprises and fully \$500,000 is invested in the development and equipment of the four mines. Equipping these properties was an expensive procedure, as all of the piping, giants and machinery had to be carried in by pack pony over the mountain trail from West Fork. An attempt was made by one company to flat the machinery by barge down Rogue river, but the experiment proved a failure. As the diggings are very rich, the placers will give full returns for the heavy outlay after two season's work.

From all indications, operations in the old Greenback mine in the Grave Creek district will be resumed in the near future. Five of the 40 stamps have been operated

lately and it is reported that the remainder of the battery will begin dropping before long. W. H. Brevoort of New York, who owns the Greenback, was here recently looking over the property and laid plans for its future operations. A few men are employed. The Greenback's suspension almost three years ago was due to internal troubles. The property was producing heavily when work stopped, as the 40 stamps were pounding night and day on good ore. The main ledge was opened to a depth of 1,500 ft., but the bulk of the ore came from the levels down to 900 ft. Most of the ore between the 900 and 1,500 levels is yet to be removed, and it is this that will supply the rock for the future. The Greenback lode is remarkable in that it sustains its free-milling values on the deep levels. Some of the richest quartz found in the mine came from a depth of 1,900 ft.

The American Gold Fields Co. of Chicago, which owns the Granite Hill mines in the Louse Creek district near Grant's Pass, was unable to resume operations on the property this summer on account of the financial stress. The company, however, has cleared up all its obligations and has a clear title to the property. It has also kept everything in good shape on the mine, the mill being in fine condition, and all of the machinery and equipment is ready to begin operations on a day's notice. Superintendent Charles Morphy has remained on the mine and has employed a few men. It is the expectation to begin work this fall. W. J. Morphy is manager.

Regular shipments are being made from the Oriole, from which returns of from \$200 to \$400 to the ton are received.

The hydraulic placer properties of the district, including the Royal group, Anderson and Lewis have cleared up for the season. The camp produced about \$60,000 in virgin gold this year, the greater part of which came from the Royal group placers.

Work has been begun upon the enlargement of the Rogue River Power Co.'s plant at Gold Ray, to increase it from 2,000 to 3,000 hp. The company will expend fully \$100,000 in the improvement and enlargement of the plant. This power enterprise supplies energy for all the important mines of the southern Oregon district, extending north as far as the Greenback and south as far as Ashland and Jacksonville. A large crew will be employed in the enlargement of the plant and the work will be carried on day and night. New turbines will be placed, additional generators installed, a larger power house built and a new water channel constructed below the dam. Colonel Frank Ray of New York is president of the company.

The Gold Hill Canal Co.'s properties, which were recently bought at auction by the Marion Trust Co. of Indianapolis, Ind., will be improved and developed. This company has taken over the properties to satisfy a claim held against the old canal enterprise, but hopes to carry out the original plans of that concern. The canal and power plant, as contemplated, will not only irrigate a vast territory of arid lands, but will supply im-

mense power for placer and quartz mining in the Gold Hill, Evans Creek and Grant's Pass districts. The three leading men in the enterprise are W. E. English, W. R. McKeen and Frank M. Faurore, all of Indianapolis.

## SOUTH DAKOTA.

## Deadwood.

It is probable that the Holy Terror and Mainstay properties at Keystone will be consolidated and be operated jointly by the New York and local owners. T. R. Griffith of Keystone, who has been in the east for some weeks, sends word that the deal will probably be accomplished. The Holy Terror is known as the second deepest and one of the richest properties in the Black Hills. Years ago considerable high-grade gold ore was regularly mined there and the company became a dividend payer until water overcame the successful operation, which, combined with legal difficulties, caused the property to close down. The Mainstay is a rich piece of ground that has been successfully operated. By the consolidation of the two greater facilities for treatment and economical mining of the ore are offered.

In the work of developing the Gold Queen Mining Co.'s ground near here, a new ore body that promises to be one of the best in this section has been encountered. A tunnel to the west 50 ft. below the collar of the shaft was run 40 ft. before the ore was encountered. A quartz ledge similar to those in the Homestake ground was penetrated and it appears to be permanent in character. The ledge is over 100 ft. wide and is still being opened up. Some of the Iowa stockholders are expected here and it is probable that it will be decided to sink the shaft, which is now down 200 ft. to the 500 level. The machinery and necessary equipment are on the ground and the work can be commenced at any time.

The mill of the American Eagle Co. in the Portland district, which for some weeks has been undergoing a reconstruction and overhauling, is now ready for operation and will soon be started up. A Dorr classifier with a capacity of 100 tons daily has been installed, together with other improvements. The filter press is now capable of handling over 30 tons of slimes per day and if this figure is exceeded another press will be added. M. A. Graves, one of the directors, and C. C. Ponsonby, vice-president of the company, are here from Minneapolis and will remain until after the plant is in full operation.

Work on the 100-ton treatment plant of the Hercules Mining Co. is expected to start within a few weeks. The development of this property, known as the Cooper ground, situated at the mouth of Ruby gulch above Bare Butte creek, has been going on for two years, but the company got into the hands of a receiver some years back, which retarded its opening up. In the 200-ft. shaft a rich ore body of some proportions is now being developed. The vein is 6 ft. wide and the ore assays from \$2 to several hundred dollars to the ton in gold. Much ore is being sacked and shipped for treatment.



In another shaft a large body of shale ore running from \$4 to \$12 gold is being opened. Drifts in 150 ft. each way are still in ore. The depth of the ledge is over 30 ft. It is on this ledge that the company is depending for material for its mill.

In the Two Bit district the Hailstorm mine, one of the old-time producers owned by the Zipp estate, is again attracting attention. A new and important ore body has just been located which appears to be between 25 and 35 ft. wide. It readily yields free gold in the pan.

The Mogul Mining Co. is making arrangements to mine ore from the Hard-scrabble mine and is having the track from that property to the mill at Pluma repaired. A force of miners has also been put to work on the Lucile ground preparing for active mining and shipping from that point within a few weeks.

The Golden Reward Co. is also repairing its track to the Los Animas mine, where shipments will be made within the next 10 days. At the annual meeting of the Golden Reward Co. held here the old board of directors was re-elected. They are: E. H. Harriman, August Belmont, O. H. Halm, Harris Franklin, Chas. C. Tegethoff, Robert W. Golet, George G. DeWitt, Henry W. DeForest and W. B. Devereaux. Mr. Harriman owns a controlling interest in the property. The company during the past year has made many improvements in its plant and has conducted some successful and interesting experiments in the crushing process that will mean a more economical treatment during the present year. The present daily capacity of the mill is 400 tons of ore.

#### Hill City.

Through the aid of the New York stockholders of both companies a merger is about to be effected between the Holy Terror and Mainstay companies that will result in both being operated jointly. Both are high-grade gold properties and their consolidation will greatly increase the output of the southern hills.

Arrangements are being made by President Clark of New York to recommence operations on the Omega ground near Pactola and to erect a suitable plant. The ore ledges average better than \$4 in gold and are well developed.

Eastern men are behind a plan to continue work on the ground at Pringle, Custer county, where a 7-ft. vein of copper pyrite and gold ore has been encountered in a 60-ft. shaft.

The J. R. mill is again in operation, as the mine is entirely unwatered, and the 10 stamps will be increased if the present treatment proves successful enough.

The Mulholland ground near Custer peak will be opened up at once by the Nebraska owners. It contains several small ledges of high grade gold ores.

### UTAH.

#### Salt Lake

There is considerable activity in nearly every one of the mining properties in American Fork canyon. A good shipment of ore is being taken from the North Star mine, operated by H. W. Owens and sons.

The Hazel Mining Co. is working a

large force of men with good results. The other properties in the camp are also being worked with good results.

Jesse Knight and J. C. Evans have closed a deal whereby they secure control of 19 claims adjoining the Horn Silver property on the west in Beaver county. The property was taken over from a prospector named McHale for a consideration of \$30,000. Recent developments in the Horn Silver mine are said to have led up to the deal. It is claimed that the Horn Silver Co. spent a fortune in the unsuccessful search to find the continuation of the rich ledge from which it has taken out probably better than \$10,000,000. Only recently it began to drive to the western portion of the territory and found the great ore zone in that section.

It is announced that work is to be resumed at once on the Ohio Co.'s properties in Bingham. The work will be under the personal direction of Colin McIntosh, while it is understood that Captain Duncan McVie will continue to act as consulting engineer. There was sufficient money on hand to continue the drift in the face of the long tunnel, which is to get under the ore zone at a depth of 1,800 ft. An upraise is to be made from this tunnel to connect with the ore bodies which were opened up at a depth of 500 ft. in the main workings.

The mill is to be rushed to completion and is to be ready for the reduction of the ore as quickly as the connections are made with the tunnel.

The directors of the May Day Mining & Milling Co. have posted the usual \$12,000 monthly dividend. The fine grade of high-class ore that has ever been produced by this property is now being sent to the market. The milling plant is running at full capacity 10 hours per day.

Manager R. J. Jarvis of the Rainbow Mining Co., whose property is located in Little Cottonwood canyon, states that the company has recently developed a 40-ft. ledge of molybdenite which extends clear across the face of the drift, and that it is identical with the same formation found in the McDonald-Ely property in Nevada, carrying 17% of molybdenum. An 18-in. streak of copper and lead ores has been developed in this property. It occurs between walls of quartzite and granite. The tunnel is being driven ahead with the view to cutting this large ledge, which, according to surveys, is about 75 ft. beyond the present workings.

The directors of the Uncle Sam Cons. Co. have declared a dividend of 5 cents per share, aggregating \$25,000.

### WASHINGTON.

#### Republic.

The Bornite Mining & Smelting Co. is a consolidation of the Bornite, Ballarat and Lucky Bill companies, owning 10 claims in all near Northport.

The tunnel at the Liberty mine near Chewelah is in 300 ft. and a new contract has been let to drive it 100 ft. farther, in which distance it is expected that the vein will be struck.

The Jay Gold mine is again in opera-

tion, with F. C. Baily, one of the principal owners, in charge. It is expected to soon be in shape again for ore shipments.

The Copper King mine in Chewelah district is idle, but the company is formulating plans to resume work, not with the intention of shipping ore, but to further explore the mine and develop new reserves of ore.

The Metaline Mining Co., Ltd., has completed a new wagon road from Sullivan creek to Slate creek, where it owns a group of eight claims and a water right. The water right is at Slate Creek falls, where sufficient water has been secured for power for a large milling plant, which it is proposed to build on a site one-half mile down the stream. The falls are about 1,000 ft. higher than the mill site.

The Spokane Lead Mines Co. has started its concentrating mill at Metaline.

The Morning Mining Co. is encountering stringers of ore in the face of a tunnel which is believed to be in close to the vein.

H. C. Readle, superintendent of the Mammoth and Morning mines, reports having discovered unexpectedly a fine body of copper glance ore on a group of claims owned by the Mammoth and Morning companies on Flume creek.

A movement is on foot for the entire rearrangement of the affairs of the Deer Trail Mining Co., which will probably result in the formation of a new company. The movement is headed by Win. Chapin of St. Catharines, Ontario, the largest stockholder in the Deer Trail. The Bonanza, one of the company's claims, produced 880 tons of silver-lead ore in 1905, which yielded a profit of \$8 per ton. But on account of the low price of lead at that time the mine was closed down.

In Pierre Lake district the Effie R. group has passed into the hands of the First Thought Extension Mining Co. of Orient. This property lies east of the First Thought mine. Plans for developing this property have been made and work will soon be begun on it. The ore is gold-bearing quartz. J. M. Ross is secretary of the company and George T. Eves, manager.

In the North Star mine a fine looking body of high-grade gold-bearing quartz has been discovered in a tunnel which was driven along a well defined wall.

The Hester Mining Co. is about to resume work on the Regina mine, on Pierre creek.

Several improvements have been made in construction at the Napoleon mine during the present year, among which is an aerial tram. Regular shipments of 150 tons of ore per day are being made which it is expected will be increased to 200 tons daily.

The Valley Mining Co. of Valley has contracted to supply a Spokane company manufacturing mineral paint with 75 tons of iron ore per month for a period of three years.

Two more furnaces have been blown in at the Northport smelter for the purpose of handling ore from the First Thought mine and also ore from the Josie mine at Rossland, B. C., Canada.

The Ark Group Mining Co. is finding

ore containing considerable native silver in the Silver Queen mine, near Kettle Falls.

The Idaho & Washington Railway Co. has announced its intention to extend its line down the Pend d'Orielle river, and considerable activity in mining along the proposed extension is the result. The mines from 2 to 10 miles down the river from Newport are improving, and several will be reopened that have not been operated for years.

The group of the Silver Lead Mines Co. one and one-half mile from Metairie falls, consists of four claims that are being developed by shafts now being sunk on three iron caps which show lead. A hoist and an air compressor are to be installed. A flume will be built from Sullivan creek to the mine, a distance of two and one-half miles. The company is incorporated for \$150,000 at \$4 per share. The officers are, John E. Fasser, president; J. L. Long, vice-president and manager; Frank Bovan, secretary; all of Newport.

The Ponderay Copper Co. has two claims opposite Parker mountain. The property is developed by a 300-ft. tunnel, which cut a 12-ft. ledge of chalcopryite carrying native silver and copper. This property also is managed by Charles A. Fidler.

## BRITISH COLUMBIA.

Rossland. The big mines of the camp continue to earn substantial monthly profits. This is especially the case with the Centre Star group of the Cons. Minnig & Smelting Co. of Canada, which it is estimated is now earning a net profit of over \$35,000 per month. The Le Roi is once more making a good net profit each month and the dividends declared every now and then by the Le Roi 2, Ltd., are evidence enough that they are not going into debt at that property. At the Centre Star shipments have been begun to the smelter at Trail of some of the ore on the dump, which was deposited there in the early days and which contains a small quantity of gold. It is estimated that the Cons. Co. has 300,000 tons of ore in sight. This would be sufficient to last a couple of years with steady work even if the company did not own valuable ground where all indications point to rich deposits of ore as yet uncovered.

The shipments from this camp for the weeks ending July 25 and Aug. 1 and for the year to Aug. 1 are:

	Week Tons.	Week Tons.	Year. Tons.
Centre Star .....	3,450	3,540	(63,101)
Le Roi .....	1,500	1,330	48,579
Le Roi 2, Ltd. ....	525	490	15,139
Homestake .....	25	25	583
Evening Star .....	25	25	30
Curlew .....	25	25	35
Mayflower .....	25	25	95
California-Giant .....	25	25	145
Blue Bird .....	25	25	20
Red Eagle .....	25	25	25
Sunset .....	25	25	25

During the week of Aug. 1 shipments were resumed by the Evening Star, and the lessees of the Homestake and the

Sunset mines each got out a car of select ore.

The receipts of ore at the Cons. smelter at Trail were 4,545 tons and the ore receipts at the Le Roi smelter at Northport were 1,330 tons, 130 tons of which was received from other mines than the Le Roi.

The Vancouver group of mines in the Slokan country, in which the Le Roi 2, Ltd., some time ago became interested, will in future be in the hands of a company known as the Van-Roi Mining Co., a London flotation. The capital of the new company is £34,500 divided into 30,000 preferred shares of £1 each and 90,000 ordinary shares of 1s each. It is stated that all of the stock has been subscribed for.

### Phoenix.

The following are the shipments made from the mines of this district during the week ending Aug. 1 and for the year to that date:

	Week. Tons.	Year. Tons.
Granby mines .....	20,261	624,566
Knowshoe .....	14,492	78,263
Mother Lode .....	3,440	25,368
Brooklyn .....	1,280	8,420
Hawthide .....	2,260	8,300
Sunset .....	215	2,818
Mountain Rose .....	80	315
Alhambra .....	120	120
Sully .....	20	20
Crescent .....	20	50

\*Includes shipment of 920 tons omitted in report for week ending July 25.

The operations at the Boundary mines have been trimmed down to such a fine point that a good net profit is being made each month. The British Columbia Copper Co., it is said, made copper and landed it in New York during the month of June for 9½ cents per lb. and owing to the heavier tonnage treated it is expected that this cost will be materially lowered on the copper made during July.

Four of the Granby furnaces are cold at the moment of writing as they are being connected with the new blower apparatus. This will of course lower the treatment at that smelter during the following week.

As a disastrous forest fire has swept over and devastated the Fernie region whence the Granby derives its main coke supply, it is probable that the supply in the emergency coke bins will be used up before things can be gotten into order in the Fernie section again and if such a situation does come about it is likely that the Granby output will have to be curtailed.

The well known Humming Bird property in Grand Forks district has been bonded to New York men. Recent ore shipments from this mine amounting to 468 tons returned the lessee \$26.66 per ton.

Active work is going on at the Diamond-Texas, Tip Top, E. P. U. and other small but promising mines in this section and operations are soon to be resumed on the Prince Henry, Skylark, and others.

The Canadian Geological Survey has a field party making a survey of Hedley camp and good headway is being made.

### Victoria.

Considerable activity in the development of the mineral resources of the Queen Charlotte islands is being made manifest.

Timber, coal and oil are found on the islands as well as valuable metallic minerals. At Tasoo harbor on Moresby island there are large bodies of copper ores, consisting mainly of chalcopryite with iron and lime in such proportion as to make them self-fluxing. Assays of croppings are reported to give something like 17.5% copper, \$8 in gold and some silver. Much prospecting is now being done.

Twenty locations have been made at Tasoo harbor by Arthur Gowing which are now controlled by J. E. Corlett of Chicago; Thos. Taylor and F. E. Elliot of Revelstoke and Mr. Gowing. The copper ore body has an average width of 70 ft. and can be traced for miles. It is intersected by ledges of arsenical iron from 50 to 100 ft. wide. This arsenical iron carries from \$4 to \$6 in gold.

The Nubia Gold Mining Co., composed of Vancouver, Seattle and Tacoma people has recently acquired a group of 50 claims at Gold harbor on the northwest coast of Moresby island. The ore is free-milling quartz said to assay better than \$100 to the ton. Development work is being done on a 15-ft. vein. Twenty-three men are at work on three shifts driving a tunnel on the lead. E. Brin of Seattle is president of the company and Major Newberry of Pittsburg is managing director.

Alfred C. Garde, formerly manager of the Payne mine in the Slokan district, has recently examined the mining camps on Moresby island and has taken options on some copper properties for eastern men whom he represents.

## MEXICO.

### Cananea.

A party consisting of Thos. Stark, J. V. H. Beatty, James Berry, C. P. Shierer and Congressman Broussard, all of Thibadeaux, La., was in Cananea last week. The men were guests of Thos. McEniry. A majority of them are stockholders in the Sonora Cons. Mines Co., of which Mr. McEniry is the promoter, and a visit to the property was the principal object of their presence in this section.

About 40 men are employed at the Escada silver mine, in the Ajos district, about 60 miles east of Cananea, and a high grade of ore is being extracted for shipment. Some mining men from Nevada are examining the mine with the view of purchasing. The postmaster at Bocoachi is the present owner.

George Dunn of Bisbee has recently made a strike on some claims of his lying adjacent to the Escada. He has put down an incline shaft to the depth of 40 ft. and uncovered a 3-ft. vein of ore running on an average of \$100 to the ton. The ore carries about 11% bismuth, and is high-grade in gold and silver. Apart from work done on the scene of the new strike Mr. Dunn has done considerable work on the original ledge which he located and received titles to over two years ago. Five tunnels cut the ledge, which at each cutting gives good returns in gold and silver. In one place a shaft has been sunk to connect with one of the tunnels, in which a good showing of copper ore exists.

R. A. Huron, owner of the Billy Boy

mine, in the Moctezuma district, denounced 62 pretencias adjoining that property last week. The new denouncement covers the extensions of the veins of the Billy Boy, taking in ground on each side and one end of that location.

J. G. Alexander, who, with his associates, purchased the El Auguima mine, three miles from Pihares, a short time ago, has recently received assays from a sample shipment which returned 1,000 ozs. in silver and 28% copper. The force of 20 men will be increased at once and active development work started. Mr. Alexander also holds a lease on the San Pedro mine and has shipped 12 cars of profitable ore from that property since the first of the year.

Hugo J. Donan has had an attachment filed against the Cerro Colorado mines, mining claims, mills and other property, in the Arivitas district. The claim is for a debt due the plaintiff aggregating the cash equivalent of said property. A lien has also been filed against the same property by Albert Steinfeld & Co. of Tucson, Ariz., that firm claiming a balance due for materials furnished the operating company of \$1,835.74. The Cerro Colorado silver mining claims and equipment have been in charge of Chas. E. Udall, who has been developing the property under adverse conditions.

Control of the Douglas Copper Co. has been turned over to the Mexican Exploration & Milling Co. through the acquisition of 51% of the first named company's capital stock by President Douglas and associates, who control the Mexican corporation. The Mexican company will hereafter perform any financing that may be necessary and be the operating company for the company absorbed. The new company has an authorized issue of \$1,500,000 bonds, of which it is selling \$500,000, a portion of the proceeds of which is to be used in paying for the installation of a large addition to the smelter which has just been put into commission.

#### Oaxaca.

The sampling of the La Chiveta dump in the Ejutla district has just been completed. The dump is from old Spanish workings and contains about 3,000 tons of ore averaging 22 pesos to the ton in gold and silver, in addition to 9% of lead. The owner expects to erect a mill on the property to treat the dump as well as the ore being taken from the new shaft on the property.

The crosscut on the 212 level of the San Jose mine, in Taviche, is now in 60 feet. A new pump has been installed, allowing the work to be carried on much more rapidly than before, as there is now no trouble with the water.

One of the most important deals that has been made in the state for the past several months was the purchase of the Carmen mines, near Teojomulco, by the Indiana-Oaxaca Mining Co. The purchase included 58 1/2 pretencias. The principal development has been on the Navidad claim, where an incline shaft has been sunk 180 ft. on the vein, with two levels in ore. The property is equipped with an efficient steam plant. It

is the intention to sink the shaft 100 ft. lower and to continue the present drifts. Efforts will be confined entirely to development work for the next year, during which time it is hoped to be able to block out enough ore to justify the erection of a reduction works on the ground. Besides the Navidad, the company will open several other old workings on its property.

The final shipment of five cars of machinery for the Guebeshe mill was unloaded last week and is being transported to the mine.

The Cia. Minera del Sur, an American company, has been formed under Mexican laws to operate in this state. The company owns some valuable properties in the Teojomulco district.

#### Guadalajara.

A strike of 12-oz. gold ore is reported from the San Carlos mine of the Mezquital group in the Mezquital del Oro district, state of Zacatecas. There is a 50-stamp mill on the properties. The Mezquital group is owned by the San Carlos Gold Mines, Ltd., of London, England. The mill has been shut down and but little work has been done in the mines during the absence of Manager E. H. Gregory, who is in England, but work will be resumed on his return at the close of the rainy season.

A new silver-lead strike is reported on the General Escobedo mine of the Laredo Mining Co. in the Concepcion del Oro district, state of Zacatecas. The vein is 20 ft. wide and shows the entire length of a shaft completed to a depth of 140 meters. Shipments will soon be begun. So far all work has been confined to development and improvement of the property. Col. Brewster of Laredo, Texas, is president of the company.

It is reported that a standard gage branch road 29 km. long is to be built to connect the recently-discovered coal fields east of Zapotiltic, this state, with the Mexican Central railway at that place.

#### Saltillo.

Work on the Paloma mine in the northern part of this state is being done and it is estimated that 100,000 tons of ore has been blocked out. The ore body averages 6 meters in width and its grade is increasing with depth. The present production is about two cars per day of ore assaying from 22 to 25% lead, 30 to 36% iron and 150 to 200 grams of silver to the ton. The working force has been greatly increased and it is expected that by Sept. 1 the production will be at least 3,000 tons per month. A shaft is being sunk from the top level and is now down 30 meters. It will meet the crosscut from the Rosalia mine, now in over 130 meters, at a depth of 84 meters. An 8-hp. gasoline hoist is in use in the shaft. A gravity tramway 750 meters long has a capacity of 250 tons per day. Atanasio Sanchez is president, Francisco Zambrano, secretary; J. A. Thompson, engineer and Francisco Arguelles, superintendent at the mines.

#### Guanajuato.

The Guanajuato Cons. Mining & Milling Co., Guanajuato, has just placed in service at its Serina mine a shipment of

electrical machinery from the Westinghouse Electric & Mfg. Co. of East Pittsburgh, Pa. This is the largest electrical machine ever received in Guanajuato; it comprises a 200-kw. rotary converter, for supplying direct current to the various motors in and about the mine and for operating the electric locomotives, which latter are used to haul the ore from the mine to the mill. The direct current motors within the mine are used to operate hoists and pumps. With this rotary converter has been received a complete marble switchboard for controlling the direct current circuits running from the direct current side of the rotary into the mine, and for controlling the alternating current side of the rotary as well. The Guanajuato Power & Electric Co. supply this company with alternating current, which, by means of transformers, is reduced from 15,000 volts to between 300 and 400 volts. The direct current voltage as it leaves the rotary is approximately 550 volts. This large equipment makes a substantial addition to the already very complete installation of this company. The new equipment was purchased through G. & O. Baniff & Co.

Joseph Mac Donald, general manager of the Guanajuato Cons. Mining & Milling Co., states that he will install a 200-ton Burt filter plant at the company's Pastita plant for the treatment of slimes.

This company will also erect a 100-ton cyanide and concentration plant at the El Carmen mine, bids for the construction of which have been asked. In addition a 100-ton slimes plant will be erected at the El Carmen to treat the slimes from the mill.

Ore from the Barragana mine, also owned by the Guanajuato Cons. Co., will be treated at the Pastita plant. In case the Mineral Belt road is not soon completed the management of the Barragana will either put in an electric line in continuation of the narrow gage line from the Pastita to the Sirena mine or erect an aerial tramway from the Barragana to the Pastita plant.

The Guanajuato Power & Electric Co. has installed four new 1,000-hp. transformers, making a total of 8,000 hp. It is the intention of General Manager Norman Rowe to further increase the capacity to 12,000 hp. The cost of the improvements made has been about \$100,000.

At the present time there are 600 stamps in operation in the Guanajuato district with a total milling capacity of 2,300 tons daily. The monthly output is now about \$900,000.

Andres Garza Galom of Monterey has begun the exploitation of his coal mine in the Zapotiltic district on a large scale. Machinery has been installed and a large number of laborers are employed.

It is rumored that an American company is to begin work this month on a large smelter in the Ameca district.

#### Hermosillo.

Active development and exploration of its Ryall and Nix concessions on the Yaqui river have been begun by the Yaqui River Mining Co. The territory covered by the concession lies in the districts of Ures, Hermosillo and Guaymas. The office of the company will be at Fundacion.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

James MacFarland of Denver and Russell Hopkins of Atlanta, Ga., have succeeded Duncan McViche and George Baglin in the directorate of the Ohio Copper Co.

Mr. McViche will continue with the company in an advisory capacity.

Recent auction sales in New York included 17,000 shares of the Llano Mining and Milling Co., at \$50 for lot; 26 shares Texas & Pacific Coal Co., at \$76.75; 2,000 common shares United Copper Co., at \$8; 10,000 shares Tri-Metallic Mining, Smelting and Refining Co., at \$143 for lot.

Bankruptcy proceedings have been instituted against the Arizona Cons. Copper Co., owning copper property in Santa Cruz and Pima counties, Arizona. Harry E. Creighton of Tucson, Ariz., was appointed receiver. The stock of the company is held largely in Pottsville and Bethlehem, Penn.

Application has been made to the district court at Salt Lake, Utah, for the dissolution of two of the Jesse Knight Mining companies. One is the Juab Mining Co., with a capital stock of \$250,000, and the other the Plutus Cons. Mining & Milling Co., with a capital of \$300,000. The first distributes among its stockholders assets valued at \$13,800, and the latter \$30,000. These properties will be found in another corporation later.

The board of directors of the Arizona Commercial Copper Co. has authorized the issue of \$500,000 first mortgage 10-year convertible gold bonds, principal due and payable Sept. 1, 1918, bearing 6% interest payable March 1 and Sept. 1. The American Trust Co., Boston, will act as trustees for the bondholders. The bonds are secured by a first mortgage covering all of the company's mining property as well as the standard gage railway which the company owns and operates.

The North Lake Mining Co. has been organized to operate the lands immediately north and east of the Lake Minnig Co.'s property in the Lake Superior region. The tract comprises 1,120 acres in sections 28, 29, 32 and 33 and is traversed for a distance of at least 7,000 ft. by the Lake lode and also for a slightly shorter distance by the Knowlton-Evergreen series of lodes, while both the lodes recently discovered by the Adventure must necessarily strike across the property. The company is being handled in the east by Stephen R. Dow & Co. of 50 Congress street, Boston, and Mr. Dow will be its president. He is also president of the Franklin Mining Co. and a director of the Adventure Mining Co.

C. C. Clapp & Co., of Boston, in which Thomas W. Lawson is interested, has undertaken the flotation of the stock of the Amalgamated Mining & Milling Co., which controls a group of mines at Pachuca, Mex. The company is capitalized at \$5,000,000. Among the mines owned by

the company are La Atarpea, San Isidro, San Nicolas, Marquesotes, El Porvenir and La Laguna. Seventeen claims in a 50-own by the company, in addition to a 50-ton mill. Most of the properties are antiquas, with good producing records. It is intended to increase the mill capacity and install a cyanide plant. The officers of the company are: Heddley Lulow, president; Sidney Lulow, treasurer; Felix Diaz, W. H. Armstrong, and Richard T. Sobey, directors; R. A. Mills, secretary; Jeffries White and Alfred Bishop, consulting engineers.

### Official Reports.

#### UTAH COPPER CO.

According to the quarterly report of the company ending June 30, the company is making a net earning at a rate of approximately \$2,000,000 a year. The report, which is signed by C. M. McNeill, president, Spencer Penrose and D. C. Jackling, forming the executive committee, says:

It has been determined by your board to issue a statement quarterly, presenting such information as will keep the stockholders in general touch with the results obtained without waiting for the more detailed annual report.

The new Garfield plant was started up late in June, 1907. As you have been advised, the capacity of this plant is 6,000 tons per day, and is comprised of 12 complete sections of 500 tons each.

The first two sections were started in regular operation July 1; the third and fourth sections were put in operation July 15; the fifth section, August 17; the sixth, September 1; the seventh, November 2; the eighth, December 18; the ninth, March 20, 1908; the tenth, May 1.

The eleventh section will be put in operation August 1, and the twelfth, probably, sixty days thereafter.

For the quarter ending June 30, the gross production of copper amounted to 11,568,390 lbs. The average cost for the quarter was 8.16 cents per pound on the net copper, resulting after allowing smelter deductions.

Net profit from mining and milling for the quarter ..... \$486,997.56  
Additional income from rents and other small items ..... 6,496.51

Total gain for quarter ..... \$493,494.07

The earnings for the quarter are based on 12½-cent copper for the months of April and May, and on 12½-cent copper for the month of June, although copper sold during this period brought prices slightly in excess of the average of these figures. At the present time the company has no finished copper on hand unsold.

The directors expect a gradual improvement in results and profits as steam shovel operations progress. Up to the present time it has been impossible to avoid mining and milling a considerable

amount of surface oxidized material, owing to the conditions surrounding our mining and stripping operations, but improvement in this respect will follow as the area in which the steam shovels have to work becomes less restricted.

The production for the 12 months, ending June 30, shows an increase for each quarter as follows:

First quarter, July, August, September, 1907	5,365,368
Second quarter, November, December, 1907	7,716,712
Third quarter, February, March, April, 1908	8,227,939
Fourth quarter, April, May, June, 1908	11,568,390
Total	33,118,409

It may be interesting also to comment upon the fact that during the quarter just ended 34% of the ore came from underground mining, by the "caving" system, and 66% from steam shovel operations.

The percentage of steam shovel ore will gradually increase, thereby reducing to a considerable extent the cost of mining.

The executive committee, at a meeting held on the 27th day of July, 1908, declared the first quarterly dividend, being dividend No. 1, of 50 cents per share, equaling a quarterly disbursement of 5% on the par value of the stock.

This dividend is payable on the 30th day of September, 1908, to all stockholders of record at the close of business the 15th day of September preceding.

The company will have on October 1 a sum of approximately \$2,000,000 available for working capital and the commencement of the payments of dividends, in addition to outside investments and the "prepaid ore expense" in stripping, chargeable against future operations; these items amounting to approximately \$750,000.

#### ALASKA MEXICAN GOLD MINING CO.

The annual report of the Alaska-Mexican Gold Mining Co. for the year ending Dec. 31, 1907, shows that the total amount of ore mined and sent to the mill in 1907 was 156,987 short tons of which 84.36% came from the 660, 770 and 880 levels; a small amount of stoping was also done at the 550 and 990 levels. It is estimated that the ore reserves above the 1,100 level amount to 794,923 tons including ore in pillars. There were 138,568 ft. of holes drilled during the year by which were broken 157,263 tons of ore. The average assay of 1,024 samples shows that the ore is gaining in value with depth: From the 550 level, 5 samples showed \$1.94 per ton; from 660 level, 215 samples showed \$2.45; 770 level, 260 samples, \$2.79; 880 level, 194 samples, \$2.85; 990 level, 268 samples, \$3.52; 1,100 level, 82 samples, \$4.22; average, 1,024 samples, \$2.80 per ton.

The following financial statement is made:

Receipts.	Total.	Per ton Milled.
From bullion	\$247,212	\$1.6205
From base bars	4,561	0.0215
From sulphurets	296,165	1.2822
From interest	2,086	0.0095
Total	\$450,063	\$3.9339
Disbursements.		
Mining and development	\$254,529	\$1.3893
Milling	26,808	0.2651
Sulphurets expense	25,823	0.1206
General expense	4,561	0.0215
Construction and repair	1,317	0.0061
All other expenses	15,106	0.0705
Total	\$361,152	\$1.6825
Net operating profit	\$288,911	\$1.3414





### Latest Quotations on American and Foreign Mining Stocks.

**Copper, Gold, Silver, Lead, Zinc, Quicksilver.**

(\*) Dividend Payers. (†) Levy Assessments

[illegible]

Mexico.1				San Francisco.1				Toronto.			
Aug 6				Aug 6				Aug 6			
Name of Company.	Share.	High.	Low.	Name of Company.	Par Value.	High.	Low.	Name of Company.	Par Value.	High.	Low.
<b>DURANGO.</b>				<b>Buffalo.</b>				<b>Dividends Declared.</b>			
Alpine, non-assess.		80.00	80.00	Alpha	1	80.00	80.00	Date		Per cent.	
Frontier, non-assess.	50			Valita	1	101.00	91.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Phoenix	1,000	1,500.00	875.00	Belcher	1	26.00	26.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
<b>GUANAJUATO.</b>				Howe & Becher	1	26.00	26.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Argentine	5,000	16.00	16.00	Bullion	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Calendula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
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Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	
Chico, non-assess.	1,000	15.00	15.00	Chalchicomula	1	14.00	14.00	Am. Int. Sec. & Tr. Co.		Sept. 1	



## Capitalization and Dividends of U. S. Mines and Works

Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies

[illegible]

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\* Illustrated

## Half Year of Rand Progress.

During the first half of the current year, the Transvaal, now accounting for over one-third of the world's gold yield, has been able to record a steady increase in the rate of production and dividend distribution. This encouraging advance has been made in spite of the gradual repatriation of Chinese laborers, whose numbers have been reduced to 21,000. Unexampled success in the operations of native labor recruiting has not only filled the demands, but at one time gave the companies the unique satisfaction of being able to turn Kaffirs away. But the influx of "boys" has been of abnormal proportions largely owing to abnormal circumstances and it would be clearly courting disappointment to assume that the prevailing conditions give promise of a perpetual future abundance. Curtailment of outside enterprise—notably at Kimberley—has greatly reduced the demand for unskilled labor. Nevertheless, the labor returns have been essentially satisfactory. In July, 1907, the aggregate of native employees was 89,593 and at the close of the year, 110,337. During the first six months of this year no less than 82,000 "boys" have been recruited, against a loss of 58,000; so that the complement rose to over 133,000. The record month was January, during which 21,000 natives sought work on the Rand, and 9,000 left the fields. During May and June, however, the departures slightly exceeded the new arrivals in number. It is a credit to Rand administrations that the replacement of large numbers of Chinese by natives—raw natives, in large measure, requiring weeks of experience to become efficient units—has been associated with only occasional, brief reductions of profit. Turning from the muscle power, by which the greater proportion of the Rand's ore is broken, to results in the form of gold yield, it is advisable to demonstrate the range of recent progress by means of summarized statistics, collated from the monthly reports issued by the Chamber of Mines. Figures for the first half of 1908 and the last half of 1907, covering the whole of the Transvaal, stand as follows: (The Witwatersrand may be held to account for 96% of the totals):

	Stamps	Tons	Yield
	at work	milled	fine ozs.
1907—			
July	8,580	1,346,004	532,711
August	8,665	1,374,455	565,907
September	8,700	1,352,986	538,604
October	8,713	1,407,157	553,553
November	8,715	1,400,296	549,801
December	8,741	1,390,626	553,526
		8,274,094	3,312,652
1908—			
January	8,775	1,459,645	590,329
February	8,770	1,343,672	541,300
March	8,830	1,502,421	574,501
April	8,875	1,406,365	565,872
May	8,920	1,540,190	581,992
June	8,955	1,800,000	674,573
		8,780,602	3,399,567

It is a notable fact that with the in-

crease in number of stamps dropped, there has also been an increase in duty per stamp per diem, owing to the more extended application of tube mills and heavier stamps.

The dividends for the half year approximate \$20,000,000 and include two new contributors, the Luipaardsvlei estate, a mine equipped on a dry crushing basis before the war and now working with 60 heavy stamps (1,350 lbs.) and two tube mills, and the Langlaagte Deep, of the Rand mines group.

The prospects of further increases in the aggregate yield and dividends are strengthened by operations proceeding in several quarters. We may note the imminent commencement of production in the Simmer Deep 300-stamp mill, designed to treat 72,000 tons per month, the resolved addition of 60 stamps to the new Modderfontein's battery and of 50 to the Robinson's. The Village Deep, when amalgamated with the Turf mines, will speedily increase its plant and there are schemes for enormous expansion in the Randfontein area of the West Rand. Less assured are the prospects of activity in the idle section of the Main Reef line covered by the Bantjes Consolidated, Aurora West and Vogelstruis Deep.

Although the big mill policy is manifestly gaining in supporters—the element of magnitude appearing not only in total capacities but in size of units, such as stamps and cyanide vats—it is interesting to observe that the two old famous properties, the Simmer & Jack and the Robinson, still maintain an easy lead. In June, the latter mine—one of the first to commence milling on the field and with several years of life before it—regained pre-eminence. Reference being frequently made to this gold producer as the greatest in the world, we have compiled some striking statistics indicating its performances from January, 1888, to June, 1908, as follows:

Tons milled	3,314,473
Yield (total)	2,711,000 fine ozs.
Yield (per ton)	36.20 fine ozs.
Working expenditures	\$20,660,000
Working profits	\$5,820,000
Dividends	\$0,670,000

Working costs, worked out over the whole life, average 24s 5-6d, whereas they are today about 12s 6d per ton milled. These figures deal with the returns for a single mine served by a single mill. In future, we may be called upon to note a far greater gold yield from one corporation in the recently amalgamated East Rand Proprietary Mines. Comparisons will cease to be placed on a common basis, for the aggregate will represent the contributions of four adjacent, but hitherto separate properties. In June, these mines—the Driefontein, Anglo, New Comet and Cason—worked 820 stamps and crushed 116,900 tons for a yield of nearly \$1,000,000. Such record figures as these, relating to a block of ground

worked by one company, provide an impressive indication of the current tendencies of Rand mining.

### Chemistry Related to Mining.

The debt the miner owes to the chemist, while he may at first not realize it, is one that he will never be able to repay. The greater part of it has been accumulated indirectly by the development of metallurgical industries on which mining depends.

The value of mineral deposits, especially those of low grade, is dependent more and more on the refinement and control of methods by which the values can be economically extracted and the products purified. Mines would be of small value if the metallic contents of the ore could not be made available for our needs. With a few exceptions, where metals occur native in the ores, their extraction is by purely chemical processes, and it is the intelligent application of chemical principles to metallurgy that has placed this industry on the high scientific plane it now occupies.

Smelting, being a chemical process, to get the best results requires careful chemical analytical control to assure both a maximum saving of the metallic values and a proper degree of purity. This is, perhaps, best illustrated in the smelting of iron. As it is the nature and amount of the impurities in iron that give it its peculiar properties, the control of the amount and kind of these impurities in the iron produced, within comparatively small limits, is essential to the production of an iron having desired qualities.

The amazing growth of the iron and steel industries is due in most part to the application of chemical methods. By the accurate analysis of the raw materials, ores, fluxes and fuels, and a knowledge of blast furnace reactions, the composition of the pig iron produced can be predetermined within very close limits. The same principles hold in the manufacture of steel from iron. It is the work of the chemist that has placed these industries on a basis of certainty so that a product of any desired composition and having certain specified properties can be manufactured with accuracy.

In the recovery of precious metals chemical methods have worked wonders in making available the values in low-grade ores which were considered practically worthless only a few years ago. The cyanide, a purely chemical method for gold extraction, has brought the cost of treatment of certain low-grade gold ores down to such a figure that ores and tailings running less than \$1.50 to the ton in gold can be profitably treated.

All ores are bought and sold on chemical analysis insuring justice to both buyer and seller. The work of the concentrator must be checked by analysis in order to detect loss of values in tailings,

or the presence of some undesirable mineral in the concentrates.

The working out of new methods for the treatment of ores, as well as devising improvements in existing methods, opens a field for chemical research that has practically limitless possibilities. Few methods are so nearly perfect that they cannot be improved so as to render them more efficient or cheaper. More than average knowledge of chemistry and skill in manipulation is necessary in chemical research connected with the utilization of rare and complex minerals and the determination of methods for their analysis and treatment. It is only through the most refined methods of chemical research that we possess a knowledge of the rare elements radium, tantalum, etc., and that commercial methods for the extraction of aluminum were discovered.

The discoveries in the field of electrochemistry and metallurgy have been productive of some remarkable results, both in the departments of electric smelting and electrolytic extraction of metals from ores and in the electrolytic refining of metals.

Great improvements have been made in methods of chemical analysis, particularly to meet modern commercial requirements for speed and accuracy. This has been accomplished by experimental work of able investigators and has made possible the handling of an immense amount of work both rapidly and accurately.

No one branch of science has been applied to more practical ends that have been of direct benefit to mining and its allied industries than chemistry and the chemist is recognized as an absolutely indispensable factor in the development and operation of mining and metallurgical industries.

### The Necessity of Good Management.

Of the greatest importance to the man who wants to invest his money in mining, is the question of management. A great mine is a very valuable property. Its worth is easily counted in the millions. But mining is open to the same danger of mismanagement as any other business. Mines are lost through mismanagement the same as farms, houses, stocks of merchandise and other undertakings are lost through the same cause. To develop a mine and put it on a paying basis requires large sums of money even when the business is well managed.

Every mine of importance has its superintendent, just as every manufacturing concern has its manager. The competent superintendent (and no other should be employed) knows his mine as the banker knows his cash on hand or the merchant knows his stock of goods. He is thoroughly versed in the operation of a mine, knowing its many features, and is capable of making it produce to its greatest capacity.

A good mine superintendent is always in demand. The United States stands at the head with an army of the most able mine superintendents in the world. Out of about 400 graduates of one American college actively employed at their profession, 83 are holding positions of great trust in foreign countries.

The best investment a mining company can make is in the employment of a competent superintendent, who should be fully compensated for his labor. He is worth every dollar paid him and not only that but it ensures to the investor (the man behind the mine) a satisfactory return on his investment.

It may not be generally known, but it is a fact nevertheless, that there are many men who have been most successful in life and who have left their impress upon its people, and its institutions as statesmen, soldiers, financiers, who have been directly or indirectly connected with the mining industry. While many have realized great fortunes from their operations or from their investments in mines, seldom is it that the fascination of mining leaves them. And why should it, when today it is acknowledged the most profitable of all industries. We speak advisedly on this question. We have no reference at all to the stock jobbing end of the business. One has but to look over the dividend tables published each week in *The Mining World*, to realize that the purchase of shares in well-managed companies pays much greater returns than any other line.

After a practically uninterrupted period of exploitation dating back to 1163, the Freiberg mine in Saxony is to be closed down. The rich veins of this wonderful mine has during the past centuries formed one of the most valuable sources of income of the royal house of Saxony. Since the serious depreciation in the value of silver it has become more and more manifest that it was economically impossible to compete with the richer ores of America. However, rather than submit the large mining population of Freiberg to the misery that would be sure to follow a complete cessation of work the state has operated the mines for several years past at a loss, the deficit for the current year totaling \$230,000. The mines now, however, are to be closed down in 1913 and the older miners are to be pensioned.

The closing down of the DeBeers diamond mine at Kimberley, South Africa, on account of the falling off of the demand for diamonds in America during the past year, must be ascribed to the recent financial stringency. Americans are good buyers of luxuries and with the return of better conditions the diamond market will undoubtedly be revived.

# Modern Gas Engines vs. Steam Turbines in Mining

By FRANK C. PERKINS,  
Consulting Electrical Engineer.

*Tests made with turbine, gas, steam and alcohol engines to ascertain their efficiency. Use of coal dust, oil, and blast furnace and coke oven gases as fuel in engines.*

*Parsons, Zoelly, Riedler-Stumpf and Rateau steam turbines. Diesel oil engine. Nürnberg and Deutz gas engines. Brown-Boveri alternator.*

shows a 600 hp. steam turbine of the Parsons type directly coupled to a Brown Boveri alternator in operation in the

in the power plant of the Luxemburger Bergwerks und Saarbrücker Eisenhütte Aktien Gesellschaft at the Burbacher Hütte, in Burbach, Germany. The gas engine is of the Nürnberg type operating at a speed of 94 revolutions per minute, and the steam turbine, occupying only a fraction of the area, is of the Zoelly type, operating at a speed of 1,550 revolutions per minute and running two direct current dynamos of 220 to 250 volts pressure. This plant was installed by the Vereinigte Maschinenfabrik Augsburg und Maschinenbaugesellschaft Nürnberg A. G., of Nürnberg, Germany. A 3,000 hp. turbo-alternator, designed to operate at 1,500 revolutions per minute, as shown in one of the accompanying illustrations, is under construction at this plant, together

The story of fuel economy of heat engines can hardly be more clearly told than by the comparative figures submitted for various gas engines, steam engines and steam turbines as submitted by W. Hort in the Phys. Zeitschrift, giving the thermal efficiency of heat machines and showing the kg. cal. required per effective horsepower hour. The horsepower hour was taken as the equivalent of 636 kg. cal.

The locomotive engine of 1,000 hp. is mentioned as requiring 7,000 kg. cal., and the compound steam engine of 200 hp. 5,000 kg. cal., while the marine steam engine of as great an output as 10,000 hp. requires 5,500 kg. cal.

As a result of Mr. Hort's calculations the steam turbine, gas engine and steam engine results are indicated in a series of very striking diagrams.

In the comparative figures, the steam turbine of 5,000 hp. and the triple expansion steam engine of 6,000 hp. are each indicated as taking 4,400 kg. cal. per effective horsepower hour, and the superheated steam engine of only 60 hp. 4,300 kg. cal.

The internal combustion engine of the highest thermal efficiency, the lignite gas engine of 500 hp. taking 4,000 kg. cal., and the benzoin gas engine of 5 hp. capacity 3,300 kg. cal. while the anthracite of 500 hp. is indicated as taking 2,900 kg. cal.

The benzoin gas engine of 25 hp. and the Morgan gas engine of 500 hp. as well as the 1,000 hp. producer gas engine are all mentioned as taking 2,700 kg. cal. per effective horsepower hour.

The illuminating gas engine of 500 hp. and the alcohol engine of 25 hp. requires the same, 2,200 kg. cal.; while the Diesel oil engine of 150 hp. leads with 1,750 kg. cal. per effective horsepower hour.

There is great interest taken in the present time in the development of the gas turbine, as well as the use of coal dust instead of oil in an engine of the Diesel type.

In the electrical power plants of modern iron and steel works, the internal combustion engine is being utilized extensively in Europe as well as in America, and both of these prime movers are formidable rivals of the reciprocating engine.

One of the accompanying illustrations

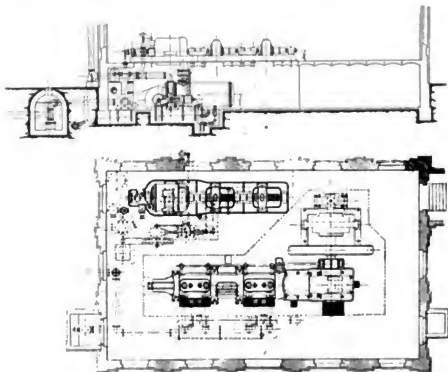


Diagram of a 1,200-hp. Steam Turbine and 1,200-hp. Gas Engine.

power house of the Konsolidierte Tschechische Braunkohlen und Tonwerke. Another installation shows a 1,200 hp. steam turbine and a 1,200 hp. gas engine

with a condenser equipment, which is also shown.

With an output of 1,500 hp. a Zoelly 1,100 hp. turbo-alternator has a steam consumption of 5.3 kgs. per horsepower hour, and 7.25 kgs. per kilowatt hour.

The steam turbine and the high power gas engine are now entering the field of power generation in iron and steel works in strong competition with the reciprocating steam engine, with every prospect of holding their own and largely supplanting the latter type of prime mover.

The steam turbine also supplements the older plants in operation to advantage, taking care of the peak of the load similarly to a storage battery, and handling the variations in load while the reciprocating engines may be kept constantly at work at full load and highest economy.

The internal combustion engine is not only able to run on waste blast furnace



A 3,000-hp. Turbo-Alternator.

gases, which heretofore have been utilized only to a very limited extent for heating the blast or for steam generation under boilers, but they also have an efficiency much greater than the best modern multicylinder reciprocating steam engine and may be used with economy even

rectly coupled to two dynamos at the Werke der Französischen Marine at Indret. Each of these dynamos has an output of 210 hp., and is directly coupled to the steam turbine, all being mounted upon a common base. When operating at full load the generators deliver 280 kw.

current of 510 volts pressure and a frequency of 50 cycles per second.

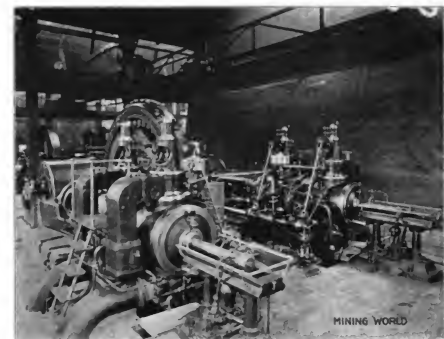
This steam turbine drives the alternator at a speed of 1,500 revolutions per minute, and has a steam consumption of 9.6 kgs. per kilowatt hour, with full load on the alternator and steam entering the turbine at a pressure of 10 atmospheres and 250 degs. superheat. The steam consumption of this unit at three-quarter load is 1.5 kgs. per effective kilowatt hour, with steam entering the turbine at the same pressure and the superheat above mentioned.

It is not only possible for internal combustion engines to utilize the waste blast furnace gases and waste gases from heating furnaces and coke ovens, but steam turbines may also be employed to great advantage and are recommended by many engineers, in place of, or as auxiliaries to, reciprocating steam engines supplied with steam from boilers fired by these waste gases.

Some engineers favor the use of the steam turbines in iron and steel plants, the water being used as feed and pumped into the boilers after cooling the cylinders, piston rods, heads and valves of the high power gas engines.

A number of steam turbine units have been installed at the power house of the Konsolidierte Tschopelner Braunkohlen-u. Tonwerke, each having a capacity of 600 hp. directly connected to a 400 kw alternator. When operating at full load with a steam pressure of 7.5 atmospheres without superheated steam, the steam consumption is 10.5 kgs. per kilowatt hour, while the same unit operated at the same steam pressure and load with 208 degs. superheat has a steam consumption of 11.27 and 12.8 kgs., respectively, at three-quarter load and one-half load without superheated steam and 10.5 and 12 kgs., respectively, with three-quarter load and one-half load, using superheated steam at 208 degs. C. and steam pressure of 7.5 atmospheres.

Very similar results were obtained by a



A 600-hp. Blast Furnace Gas Engine.

when it is necessary to supply the gas required by the producer plants.

The steam turbine can also compete successfully with the compound and triple expansion reciprocating steam engine, as it has an efficiency equally as high as the latter, a recent test of a 4,000 hp. steam turbine at Frankfurt-on-Main, Germany, showing a steam consumption of only 6.7 kgs. per kilowatt hour with an output of 29,995 kw. by the alternator, the steam being superheated to 312 degs. C. and engines of large size were designed and constructed in England by C. A. Parsons & Co., of Newcastle-on-Tyne. One of the latest installations of Parsons steam turbines in England is that of the Neespend plant of the Sheffield corporation. Each of the turbo-alternators has a capacity of 2,500 kw., and operates at a speed of 1,500 revolutions per minute.

The turbines are supplied with steam at a pressure of 190 lbs. per sq. in., and are run condensing with steam superheated at about 150 degs. F. The alternators supply a 2-phase current having a frequency of 60 periods per second and a pressure of 2,200 volts.

In Germany, the Riedler-Stumpf steam turbine is now well developed and is said to be giving excellent results, while the Rateau steam turbine, built in France by Sautter, Harle & Cie., is also coming into prominence in this field.

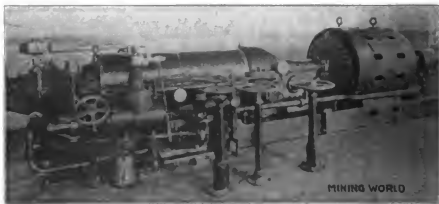
In Austria-Hungary Geans & Co., of Budapest, have installed a number of steam turbines with a large output; while in Switzerland the Parsons steam turbine is constructed by Brown, Boveri & Co., of Baden.

A 420 hp. steam turbine has been di-

rectly coupled to two dynamos at the Werke der Französischen Marine at Indret. Each of these dynamos has an output of 210 hp., and is directly coupled to the steam turbine, all being mounted upon a common base. When operating at full load the generators deliver 280 kw.

When operating at only one-half load, the steam consumption of the turbine is 12.7 kgs. per kilowatt hour.

It will be noted that the steam consumption is very much greater where the size of the steam turbine is smaller and the steam is not superheated. The increase in



A 600-hp. Steam Turbine.

capacity to 1,000 kw., and the use of superheated steam shows very much more favorable results in connection with the 1,350 hp. 3-phase turbo-alternator constructed for the Societe de Filatures de Schappe in Troyes, designed on the Brown-Boveri-Parsons system. This unit includes a 3-phase alternator, supplying a

600 hp. steam turbine of the Parsons type at the power house of the Grafliche Berg- und-Hütten Verwaltung, of Antonien hutte, where the steam consumption was found to be 9.88 and 12.8 kgs., respectively, for full load and one-half load with a steam pressure at 7.5 atmospheres

At the electric generating station of the

Friedenshütte at Morgenroth-on-Seine, there is a 600 hp. plant blast furnace twin gas engine in operation, constructed by the Gasmotoren Fabrik Deutsch. This twin double acting engine, noted in one of the accompanying illustrations, is directly coupled to an alternator of the revolving field type constructed at Berlin, Germany, by the Allgemeinen Elektricitäts A. G.

While the double acting gas engine is now extensively employed in some instances, the high power is obtained by having four cylinders of the single acting type arranged as shown herewith. The power house is that of the Gutehoffnungshütte at Oberhausen, Germany, and the engine and generator were constructed by the same firms that equipped the plant just mentioned. The gas engine is of the Deutz 4-cylinder type with a normal output of 1,000 hp. Another 4-cylinder engine of this type with 2,000 hp. is in operation at the iron and steel works at Horde W., in Germany.

At the Horder Bergwerks und Hüttenverein in Westfalen there is in operation a 2,000 hp. Deutz double acting engine of the tandem type. This engine operates on blast furnace gas and is directly coupled to a revolving field flywheel alternator constructed at the Siemens-Schuckert Werke at Nürnberg.

The engine has a stroke of 1,300 mm., and the piston measures 1,100 mm. in diameter, the speed being 95 revolutions per minute. While the gas engine is necessary and economical in iron and steel power plants there is no doubt that there is also an important place for the steam turbine and reciprocating steam engine.

The 600 hp. 3-phase turbo-alternator installed at the power plant of the Aschenlorenschacht Antoinenhütte in Carlahof was constructed at Baden, Switzerland, by the Aktien-Gesellschaft Brown, Boveri

and these steam turbine units is much smaller than electrical generators of the same output when driven by reciprocating engines on account of the greater speed at which the steam turbines operate. The cost of the alternator is, therefore, very much less than that constructed for use with the

sumption, respectively, of 9.82 and 9 kgs. per kilowatt hour, while the smaller unit operating at three-quarter load has a steam consumption of 1 kgs. per kilowatt hour. The 750 hp. turbine at the Hocht steel works at Dortmund, is directly coupled to a 500 kw. generator and has a



A 1,000-hp. Gas Engine.

high power slow speed reciprocating engine.

The steam turbine is used at the present time to quite a large extent in iron and steel plants abroad, notably at Diederhofen and Dortmund in Germany, at the Roehlingsche Eisen und Stahlwerke and the Eisen und Stahlwerke Hocht. Turbines of 570 hp. and 675 hp. are utilized

steam consumption of 11 kgs. per kilowatt watt-hour with a steam pressure of 7.5 atmospheres and 228 degs. superheat; while at one-half load this turbine has a steam consumption of 10.73 kgs. per kilowatt-hour, the pressure and superheat of the steam entering the turbine being the same as above mentioned.

The economy of steam consumption shown by the above figures for steam turbines insures their successful introduction, particularly as this is coupled with the advantages, over the high power reciprocating engine, of having a much cheaper electrical generator directly connected to its shaft; a lower consumption of lubricating oil, which is only required for keeping the bearings in good shape; a lower expense for repairs, and a smaller floor space required.

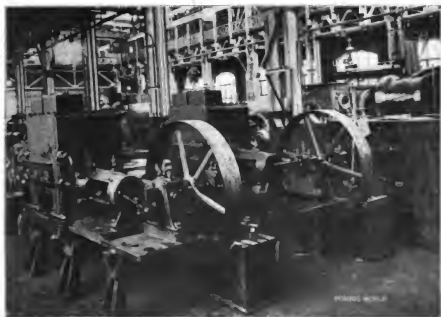
### Transvaal Gold Output.

The total gold production of the Transvaal for the month of June has been declared as follows:

	Ounces.	Value.
Witwatersrand .....	550,240	£2,337,269
Outside districts .....	24,733	105,060
Total .....	574,973	£2,442,329

The June output is 8,003 ozs. below that of May owing to the shorter working time, the corresponding decrease in value being equivalent to £31,996. This is, however, in a measure minimized by the increased production of the outside districts, which advanced from 23,741 ozs., of a value of £100,877, to 24,733 ozs., valued at £105,060.

Tennessee phosphate exports through Pensacola, Fla., for the six months ending with June were 38,771 tons as against 32,038 tons in 1907.



Condenser Equipment, Designed in Nurnberg, Germany.

& Co. It is directly coupled to its exciter which is mounted outside of the main bearing which is of the usual construction.

The size of the alternators with all of

at the former steel works, with steam pressures of 10 and 8 atmospheres and superheated steam at 250 degs. C.

These units when supplying 380 kw. and 450 kw. at full load have a steam con-



## The Engineer and the Salesman.

Specially written for The Mining World.

A few years ago it was suggested through the trade press to call all traveling salesmen "engineers." The writer of that article claimed that such a title would give a certain dignity to the commercial travelers and salesmen, raise the social standing of this class of business men and promote business in general.

Of course a man who is "engineering" any kind of a sale might be called an "engineer," but I do believe a salesman in the machinery branch should not only carry such a title, but should really be a mechanical engineer himself or have accumulated equivalent technical knowledge and shop practice.

In most countries in Europe a machinery salesman is also a mechanical engineer. When a plant is to be erected the mechanical engineer-salesman meets the prospective customer, talks the matter over, surveys the site of the plant, makes up the estimates and closes the contract. He attends to all the drawings, consults the superintendents and the foremen of the shops in regard to the best way of handling the order. He inspects the machinery before shipment, and goes with same to its destination, superintends the erection of the plant and when completed starts it and delivers it to the customer in perfect running order. In short the mechanical engineer-salesman in Europe estimates, sells, designs and erects the plant.

And there are good chances for promotion for the mechanical engineer-salesman in Europe, because all officers of a machinery manufacturing concern are mechanical engineers or have accumulated sufficient technical knowledge and shop practice to properly fill their position.

The idea of selecting a non-technical business man to fill any office in a machinery manufacturing establishment would not occur to anybody over there.

We Americans have a different system, more elaborate, more expensive, but being as it is a remnant from a time when economy was not considered and not needed, our system should not be subject to any severe criticism. We have salesmen who are not engineers, we have engineers who are not salesmen and we have draughtsmen employed to attend to draughting only. The higher officials of many of our machinery manufacturing concerns are not, as a rule, in the possession of much technical knowledge. They have merely, with a few exceptions, acquired their high position on account of business relations or on account of heavy investment in the business they represent.

This system, by which the salesmen and the engineers are separated, of course makes chances for promotion for the mechanical engineer rather limited just because he is not a salesman. When he reaches a position as "chief consulting" or "estimating engineer," his career, as a rule, is closed unless he chooses to start in business for himself as manufacturer or consulting engineer. He cannot climb the ladder any higher, while in many cases by his knowledge he assists the non-technical commercial men around

him to reach the highest steps on the same ladder.

Of late years, however, a slight tendency to better these conditions has appeared. We travel so much now in foreign countries learning a little economy here and there, and I believe the engineer-salesman will soon be well known and well liked here in the United States. In the large machinery manufacturing establishment with which the writer is connected, nearly all the higher officials including the president and many of the salesmen are engineers or have had technical and shop practice. That these men fill their positions much better than their non-technical predecessors is an established fact and great results are already visible.

Under the present admirable methods of doing business it will be easy for the engineer to handle the sales of the machinery he designs, should it be generally adopted, as I hope, all over the union, to create these engineer-salesmen and engineer officials in the machinery manufacturing circles. The great competition nowadays in the machinery world also recommends economy and could we hereafter fill vacancies in the sales departments with engineers or men with equivalent technical knowledge and shop practice great results could be expected. Let the non-technical business man reign supreme in other than the machinery manufacturing branch, but let us have the engineer-salesman for engineering as well as for "engineering" the sales.

The engineer loves his profession—I never met one who did not—and he will specify in every case exactly what is needed and will sell only what is needed, thereby creating perfectly satisfied customers and building up in the most substantial manner the reputation of the company he represents.

## Gypsum Industry in U. S.

The gypsum mined in the United States in 1907 amounted to 1,751,748 short tons, exceeding the production of 1906, which was far in advance of that of any previous year, by 211,163 short tons, or 13.7%.

The greater part of the output was converted by grinding and partial or complete calcination into the various plasters, such as plaster of paris, stucco, cement plaster, flooring plaster, and hard finish plaster. Considerable quantities are ground without burning and used as land plaster or fertilizer; smaller quantities are used in the manufacture of paint and paper, imitation meerschaum and ivory, and as an adulterant. A pure white massive form, known as alabaster, is much used by sculptors for interior decoration.

The total value of the gypsum products in 1907, plus that of the gypsum sold crude, was \$4,942,264, or about 28.8% greater than in 1906. The statistics therefore indicate a satisfactory rate of growth of the industry, notwithstanding the season of financial depression by which it was handicapped.

Gypsum occurs in sedimentary rocks of practically all ages, either in the crystalline form or as rock gypsum, and is widely distributed geographically.

## Mexican Petroleum Industry.

BY W. W. CANADA.\*

Oil producing lands have been discovered in the state of Veracruz, near the Isthmus of Tehuantepec, and the flow of oil in the wells has been of such a quantity and quality that an English company has erected a large refining plant at Minatitlan, which is not only built on the most modern lines, but as regards capacity is the largest by far in this republic. The plant will be in operation within a short time.

Illuminating, lubricating, and fuel oils are to be manufactured. The company has erected 16 1,000-bbl. crude stills, five 500-bbl. lubricating oil stills, 17 200-bbl. tar stills, five 1,000-bbl. steam stills, three 1,000-bbl. agitators, eight 500-bbl. agitators, 10 95-ft. storage tanks, each of a capacity of 47,000 bbls., and in addition 26 storage tanks that range in capacity from 2,000 to 5,000 bbls. each.

The company owns the wells, and as it also operates the Tehuantepec National railway the latter's engines will be supplied with fuel oil. Large storage tanks are being erected at Veracruz and other places to supply the several railways in this part of the country.

An oil company with headquarters at St. Louis, Mo., with refineries at Mexico City, Veracruz, and at Tampico, has had for many years practically a monopoly of the trade in Mexico. The company carries its crude oil from Philadelphia to Veracruz and Tampico by tank steamers, from which it is pumped direct into the company's storage tanks.

The Veracruz refinery has a capacity of about 350,000 gals. of crude per month; the one at Tampico is much larger and has at present a capacity of 1,000,000 gals. but is being enlarged, and when this has been accomplished will have a capacity four times as great as at present. The Mexico City plant has been closed, and the material will be utilized in part for the increased capacity at Tampico. There is another smaller plant operated by a stock company at Veracruz, but its output does not materially influence the market.

The import duty on crude mineral oil is fixed at \$1.30 Mexican (\$1.64 United States currency) per 100 kgs. (220 lbs.); the duty on refined, however, is \$1.80 Mexican (\$2.86) per 100 kgs. legal weight, and on lubricating oils \$13.20 Mexican (\$6.75) per 100 kgs. gross weight. Legal weight is the weight of the article including that of its wrappings, cans, etc., but not the outside packing case. The costs of importation are slightly in excess of the figures given to cover harbor and other improvements by which the municipality benefits.

Illuminating oils are now sold at Veracruz at the following prices: Standard white, 110 test, \$6.25 Mexican (\$3.11 U. S.) per case of two 5-gal. cans, and is sold in bulk from tank wagons at 14½ centavos, Mexican, per liter, the equivalent of about 27 cents United States currency per gal. Naphthas bring from \$7.35 to \$8.95 Mexican (\$3.96 to \$4.46 U. S.) per case of two 5-gal. cans.

\*U. S. Consul at Veracruz.

# Treatment Locally of the Ores of Topia, Mexico.

By T. C. GRAHAM,

In classifying the ores of Topia taking the clean vein matter as it falls and after numerous tests made by competent people, the following results have been obtained:

	Per Silver.	Lead.	Gold.	Zinc.
	cent.	klton.	% grms.	%
Hand picked for export	11	3,900	45.00	2.00
Ore to mill	61	2,016	11.16	2.40
Lost in milling, tramming, etc.	04	2,000	42.00	2.00
Discarded as waste	18	0.200	.06	....
Discarded as blende	06	0.400	8.00	1.5

This is true of the camp as a whole. The loss in mining, tramming, etc., is determined by cutting samples from the veins regularly for certain distances, calculating the value of the ore and comparing these results with what the ore produced. In case of transportation the discarded zinc would leave a handsome profit.

Continuing with the previous table we would have as follows:

	Gross.	Ore.	Silver.	Lead.	Gold.	Zinc.	Gross value.
	%	kgs.	grams.	kgs.	grams.	grams.	%
Sorted ore	11	110	0.320	40.5	0.33	8.50	19.4
Milled ore	61	610	1.230	68.1	1.50	91.56	72.0
Waste	18	180	0.036	10.8	....	....	....
Blende	04	40	0.024	4.8	0.09	25.20	8.6
Loss	06	60	0.080	16.8	0.08	4.40	....
Totals	100	1000	1.700	141.0	2.00	129.96	100.0

From the above it will be seen that the 11% of shipping ore, carries 19.4% of the total values; and of the total value in silver of the ore bodies only 91.4% is available. Also that unless concentration of the milling ore be resorted to, before lixiviation, only 35% of the total lead contents is recovered, being that portion of the lead contained in the shipping ore, and that 70.4% of the zinc in the ore is retained in the milling ore, which, with an extraction continually of from 85% to 90% indicates that the zinky ore can be leached successfully.

From the Amador properties 164 samples were cut of which a composite sample was made, taking 1 grain of ore for each 10 c. m. of width of vein. This composite sample was assayed and analyzed, and the results were also calculated from the individual assays of the samples all of which are compared in the following:

	Calculated	General
	Sample results.	average.
Composite Silver	2,000 kgs.	2,182 kgs.
Lead	6%	15%
Gold	4 grams	2 grams
Copper	1%	1%
Zinc	19.6	13
Insoluble	49.5	5.1
Iron (Fe)	6.9	....
Lime (CaO)	2.2	....
Sulphur	11.8	....
Total	97.1%	....

In comparing these results it is seen that the lead and zinc occurs in inverse ratio and that the gold accompanies the zinc and iron rather than the lead.

At present the ores are hand-sorted, the heavier lead ore being separated for direct shipment to the smelters. The yellow rosin blende is discarded carrying but little silver, while the black variety carrying from 8 to 12% of iron is sent to the mill

*Distribution of the ores produced and analyses of their metallic contents. Sorting done generally by hand.*

*Outline of the practice of crushing and milling (by lixiviation). Ores are easily concentrated. Bartlett and Wilfley tables. True vanners.*

to be leached. A portion of the ore which carries about equal parts of lead and zinc is crushed and hand jigged. A clean lead is produced, which assays about as follows: Lead, 60 to 75%; gold, 2.5 to 3 grains; silver, 1,600 to 2,500 kgs.

The resulting zinc is divided into two classes: the one carrying considerable

the ore was crushed by stamps and the latter by hand. The results were satisfactory and a clean lead produced which commanded a high premium from the smelters, but the loss in silver was high, amounting to 15% of the gross value and is due to lack of sizing principally. The fine dust carries a high percentage of values and should be separated and leached instead of being allowed to go to the concentrator's with the coarser material.

The Topia Mining Co. made some experiments in concentrating, which were unsatisfactory, owing to the mode of crushing. The ore was crushed to 20-mesh by stamps and concentrated on Bartlett tables, a saving being made of 80% of the silver and 85% of the lead. The loss was due to the fact that the metallic contents of the ore was ground to a fine powder and floated away.

The writer is deeply indebted to T. L. Lawrence, an American mining engineer, and for some years past a resident of Topia, for the results of the experiments with the ore of Topia, as herein given. Mr. Lawrence has made a very careful examination of the local treatments, and his deductions are worthy of consideration.

Recognizing the above facts, Mr. Lawrence sent six tons of ore to Milpillas, near Topia, where rolls are employed in crushing. The result was that about 60% of the metallic contents of the ore passed through a 20-mesh screen, the first time through the rolls and that a minimum of slimes was produced. The crushing machinery consisted of a crusher, a set of coarse rolls and two sets, in parallel, of finishing rolls, with the corresponding elevating and screening appliances.

From these observations and experiments and others that have been made from time to time, it has been found that the concentration of the Topia ore is comparatively simple, due consideration having been given to proper sizing and the process resolves itself about as follows:

Ore to crusher, to coarse rolls, to fine rolls, to screen for removal of dust (to be leached), then to screen for sizing for concentration, to finishing rolls, back to dust screen and so on.

Sized product to Wilfley table, clean lead collected, middlings to second Wilfley tables for further separation of clean lead. Tailings from first table to two True vanners for separation of any slimes and fines. All gangue matter from vanners discarded.

Tailings from second Wilfleys, also to same vanners, middlings for second Wilfley tables which consist of blende and pyrites, collected, mixed with previously separated dust, calcined and leached with hyposulphite of soda. Total loss according to experiments should not exceed 8% of the gross value of the ore.

In the adjoining mining districts is much ore of the same character as that of Topia, where a similar treatment is necessary.

iron being sent to the mill for leaching and the yellow blende is piled up waiting transportation.

In the mill the ore is ground dry to 30-mesh, partially desulphurized, when from 5 to 7% of salt is added and the calcining continued until only about 0.5% of sulphur remains.

When the wasting has been completed the ore is drawn, piled up and allowed to stand for a day or two, which improves the chlorination, especially in the gold. When cold, the ore is charged into 10 and 20-ton tanks, washed with water to remove the soluble salts, and then heated from 7 to 10 days with a 0.3% of hyposulphite of soda. The leading solution is kept running continually as the roasted ore permits rapid percolation. The precipitation is effected with calcium sulphate which is made locally by treating burnt lime with sulphur. The precipitated solution is allowed to settle and the clear liquid is decanted into the receiving tank, the remainder with the precipitates is sluiced onto the filter, from which they are recovered, dried, calcined, sampled, sealed in coal oil cans, and shipped directly to the smelter.

The heads assay about 2,000 kgs, and the tailings, 250 grams. Soluble salts amount to about 14% of the ore. The extraction of gold is about 40% and the cost of the treatment is about \$19 per 1,000 kgs.

The assay of the sulphides is about as follows: Silver, 35%; gold, 150 to 180 grams; lead, 15%; copper, 13%.

Concentration has not been general; it has been practiced by Salvador Lopez Sues, and by Ramon Espinosa, while he was owner of La Perla. In the former



## The Salt Industry in the United States.

BY W. C. PHALEN.\*

The United States not only produced 56.6% of the salt consumed within its borders in 1907, but exported nearly 62,000,000 lbs. valued at more than a quarter of a million dollars.

The salt production of the United States in 1907 amounted to 29,704,128 bbls. of 280 lbs., valued at \$7,139,551—an increase of 1,531,748 bbls. in quantity and of \$781,201 in value over the output in 1906. Expressed on a tonnage basis, these quantities represent an output of 1,158,578 short tons in 1907, or 214,145 short tons in excess of the production in 1906. The average net value of the product in 1907 was 25,946 cts. per barrel, or \$1.79 per short ton, as against 23,631 cts. per barrel, or \$1.69 per ton, in 1906, an increase for 1907 of 1.12 cts. per barrel, or 10 cts. per ton.

For convenience salt is classified according to the grades by which it is sold by the producer, the grades being determined by the amount of refining, the methods employed in refining, and the purposes for which the salt is used. These grades are "table and dairy," which includes the extra fine and fancy grades prepared for family use and all grades artificially dried, used for butter and cheese making, etc.; "common fine," including all other grades of first quality not artificially dried; "common coarse," including all grades coarser than "common fine" made by artificial heat; "packers," "solar," "rock," "milling," "brine," and "other grades." "Packers" salt is that prepared for the purpose of curing ash, meats, etc. "Solar" salt is that made by solar evaporation. "Rock" salt includes all salt mined and shipped without special preparation. "Milling" salt is used in gold and silver mills. Under "other grades" are included the low-grade products used for salting cattle and for fertilizers, etc. "Brine" includes all salt liquor used in the manufacture of soda ash, sodium bicarbonate, sodium hydrate (caustic soda), and other sodium salts or brine sold without being evaporated to dryness. The table of production by grades, given by Mr. Phalen, shows a

3,537,157 bbls. were for "table and dairy" use, and 2,655,051 bbls. were of the "common coarse" grade.

When value of product alone is considered, this table shows that New York still occupies the leading position in the salt industry. Since 1905 Michigan has produced a larger quantity of salt than New

## Homestake Slime Plant Operating Costs.

The following statement of the operating costs of the Homestake Mining Co.'s slime plant at Lead, S. D., for the month of March, 1908, is furnished The Mining World by C. W. Merrill, metallurgist for the company, the total tons treated being 49,946:

OPERATING COSTS, PER TON, HOMESTAKE SLIME PLANT.

Item	Cost Per Ton				
	Labor.	Electric Power and Lighting	Chemicals		Other Supplies
			Item	Cost	
Thickening	00370				00006
Transportation					00030
Neutralization	00045				00006
Filling and Discharging Merrill Shuicing Presses	01040	00347	Lime, 4.476 lbs.	02236	00239
Dissolving and Washing	02468	01302	Cyanide 0.31 lb.	00200	01126
Precipitation (Merrill Method)	00281		H. C. L.	02224	01126
Heating	00214		Zinc, 127 lbs.	00762	00014
Assay Office	00314				00017
Superintendence	00011				00518
Miscellaneous	01272				00043
Fire Protection					00117
Refining, Balling, Expressage and Mint Charges					00054
					00064
Total.	07533	01965		11524	03511

\*For cloths.

Hydrochloric Acid to \$4.30 per carboy—10 carboys per press.  
Cyanide \$0.30 per lb.  
Lime \$0.003 per lb.

One suit of filter cloths lasts one year—for 24 presses cloth consumption—2 suits per month—\$0.01 per ton of slime treated.

### GENERAL NOTES.

Zinc @ \$0.06 per lb.  
Labor @ \$1.00 + per 8-hour shift.  
Power @ \$7.50 per mechanical H. P. per month.

York, but the average net price in Michigan is so much less than in New York that the difference in production is not sufficient to compensate for the difference in value. So far as both production and value go, the nine leading states maintain in 1907 the same order as in 1906. Louisiana in both years produced more salt than California.

The salt exported, most of which went to Cuba, Canada, Mexico and Panama, amounted in 1907 to 61,003,422 lbs., valued at \$232,895. The total imports amounted to 1,662,851 barrels.

In both quantity and value of output

Two additional presses are being added and grading will be begun shortly for several more in order that the additional proportion of fines which will result from the operation of the fine grinding plant now being installed, can be taken care of.

## New Chromatic Ironworks in Russia.

The Magnesite Co., owner of the iron-works on the Ural, has decided to build a new factory, with an electric furnace, for melting chromium out of chromatic iron. The location will be on the river Satka, 30 verst (20 miles) from the present works. The power for it will be supplied by utilization of the natural forces of the river, which is full of waterfalls in that locality. It is said that the grounds for the works are already rented, as well as the surface for working the chromatic iron.

**Japanese Mineral Production.**—The total output of gold by Japanese mines in 1907 was 2,736 kilograms, or 1/4% of the production of the world. The contribution of Japan to the world's silver production was 88,162 kilograms, or 2%. To the world's supply of copper Japan contributed 35,248 tons or 5%, while its output of coal amounted to \$3,716,448 tons, or 1 1/4% of the universal total. As regards sulphur, the principal Japanese mines are in the province of Hokkaido, and the results of the year's working were as follows: Asara mines, 16,958,154 kin; Yamagatokojuji mines, 9,627,840 kin; Kumadome, 5,367,050 kin; Yamamoto, 3,970,227 kin; and Iwato, 2,013,511 kin.

PRODUCTION AND VALUE OF SALT, BY STATES

State.	1906.		1907.	
	Quantity, Barrels.	Value, Dollars.	Quantity, Barrels.	Value, Dollars.
New York	8,578,620	2,098,686	9,642,178	2,335,150
Michigan	9,536,802	2,019,760	10,786,630	2,662,357
Ohio	3,256,785	789,237	3,851,243	979,078
Kansas	2,198,837	681,022	2,667,459	667,334
Louisiana	1,179,528	268,095	1,157,821	226,892
California	986,788	291,528	926,693	302,940
West Virginia	200,055	57,584	156,147	76,527
Texas	360,733	170,559	258,086	226,516
Utah	362,212	169,635	345,557	189,779
Idaho	1,867	1,867	1,600	2,040
Nevada	11,248	6,420	6,457	3,654
Delaware	9,892	4,905	800	910
Other	989,294	100,082	1105,657	61,350
	28,172,380	6,658,350	29,701,128	7,459,551

\*Includes Virginia, Pennsylvania, New Jersey, New York, New Mexico, and Massachusetts.

substantial increase in the quantities of the finer grades. Of the total output in the last calendar year 9,222,471 bbls. were brine, 7,684,638 bbls. were classed as "common fine," 5,809,328 bbls. were "rock."

\*Extract from Mineral Resources of U. S. for 1907.

the United States stands at the head of the salt-producing countries of the world, and in quantity the United Kingdom, the German Empire, and France rank next, in the order given, although the value of both the German and the French output exceeds that of the United Kingdom.

# The Nipissing Mines and Their Numerous Veins.

By ALEX. GRAY.

Nipissing mining areas embrace elements likely to determine most of the issues associated with Cobalt's silver industry—an industry that produced silver in the first half of 1908 worth \$4,250,000, according to official government data. Geologically the 846 acres held by the Nipissing Mines Co., and operated by the Nipissing Mining Co., have most of the economic rocks of Northern Ontario. Mineralogically, Nipissing sections have been a succession of prize packages and some blanks. Their infinite variety should be more appreciated by scientific fraternities; it is they which leave Nipissing in the limelight as the most fascinating mining proposition of its kind before the technical public.

The rate of discount in the market by which Nipissing was valued two years ago at \$41,000,000 instead of \$8,750,000, as at present, has led the management to wisely modify their policies. Confidences are not violated in here noting that Nipissings are no longer to be utilized for pyrotechnic purposes. R. B. Watson, general manager directly in charge, and his mine manager Hugh Park, have a series of mines, a complicated territory curiously enmeshed with fissures and veins. With the hearty assent of their directorate they are leaving it for outsiders and exuberant brokers to alternately belaud or execrate, while comprehensive plans are matured and ore reserves brought up to investment requirements.

Whether Nipissing has 100 or 200 veins in its acres, amounting to more than those of the total number of shipping mines of the district, if we exclude one company, is not going to immediately influence responsible chiefs who prefer to have more to the credit of the dividend account and two or three years' reserves "in sight," thereby disassociating the company from those who snatch profits overnight and are aggrieved because this cannot be continuously accomplished. Where a half-dozen individual Cobalt companies are creating reserves over two, three and four years, Nipissing by virtue of its holdings, must lead and not follow; hence the present field and mine working forces are distributed as follows: 115 prospectors, 137 miners, 21 ore sorters, 14 mechanics, 5 samplers, 5 assayers, 5 carpenters, 10 engineers, 9 teamsters, 10 cooks, 2 diamond drillers. Altogether 251 men are employed. Nipissing's average monthly expenditures throughout the year will be over \$300,000. Owing to the situation of the main working area, from the north end of Cobalt lake to the south end of Peterson lake, stratigraphical diversities and multitudinous fissures, necessitate several prospecting parties during the open season—two of the present parties, however, being devoted to prospecting the propitious territory immediately northwest of Cobalt lake. In 1907 no less than 21 miles of trenching was done, from one to 12 feet in depth. All told there are 25 miles of trenches. While this may seem

*Produced 6,757,971 ozs. silver to Aug. 1; value, \$3,730,176. Distributed \$2,226,000 in dividends from 6,296 tons shipped; average value per ton, \$359.*

*An area of 846 acres having most of the economic rocks of Northern Ontario.*

extravagance to the uninitiated, yet with two drills in an open cut, one find—No. 96—in three weeks more than reimbursed the company for the entire outlay. Fortunately, the company is financially enabled to maintain these operations, which began in April, 1907, and which during the year ending December 31 last produced 921,204 ounces of silver, at which

year's *in situ*, besides having a broader conception and more certainties in areas heretofore on the waiting list. Even now, 300 acres are in the "timber culture" class, the well-based idea of those in charge being to prove up the producing zones before going much further afield. As it is, air is being delivered two miles from the Kendall plant with a pressure on the receiver of 110 lbs., and Mr. Park thinks the distance all sufficient without stretching it.

These details will convince the mining scientist of the magnitude of Nipissing problems. Closer inspection and local knowledge, carry the conclusion that a company existing from hand to mouth, so to speak, that paid \$2,226,000 to shareholders from 6,296 tons shipped, \$359 per ton, bearing in mind the million dollars in ore reserves, and three-quarters of a million cash on hand or in cash assets, deserved the broader treatment being



Residential Quarters and Surface Works, Nipissing Mines.

time the relative financial condition of the Nipissing Co. as regards 1907, 1906, 1905 was:

[MINING AND FINANCIAL STATUS.]							
	Months.	Tons.	Gross Value.	Value per ton.	Net Profits.	Dividends Declared.	Surplus.
1907.....	11	2,355	\$1,467,977	\$ 623	\$ 922,788	\$ 768,000	\$760,236
1906.....	11	1,825	1,023,904	561	893,179	1,000,000	493,723
1905.....	15	918	1,160,352	1,166	1,021,628	400,000	624,628

For the first half of 1908 there was a falling off of 10 tons in production as compared with 1907. This has not been material to the accounts. December 31 last the ore reserves were valued at \$1,057,000, a large part of these being brought into "sight" during the previous 11 months, according to the report of the directors. On August 1 this year the reserves are estimated at \$1,016,000, inclusive of the more important showings only, and exclusive of recent very important discoveries, the prospects at No. 49 vein, and the result indicated by diamond drilling on the extension of the Kendall vein. So that Nipissing has a year's dividend "in sight," and another

given to it. To August 1 the areas exploited, and those more or less incomprehensible in the absence of develop-

ment, have produced 6,757,971 ozs. of silver, worth net \$3,730,176, and 4,936 ft. of shaft sinking, raising, drifting and cross-cutting have been done.

The Nipissing is alone among Cobalt companies in supplying these details of costs and profits, which are for the year 1907:

	Total.	Cent.
Mining, per ton.....	\$106.10	
Mining and treatment, per ton.....	172.00	
Average price, silver, per oz.....	0.62097	
Cost of production, per oz.....	0.1177	
Operating, (actual).....	\$ 252,602	17.3
Depreciation, (actual).....	13,719	0.9
Freight, treatment, etc.....	62,134	4.2
Smaller losses, (estimated).....	78,745	5.3
Profit.....	1,062,783	72.8

On August 1, 1908, the value of avail-

able ore in the various veins was as follows:

Meyer vein	28,000
No. 26 vein	23,000
No. 49 vein	175,000
No. 84 vein	47,000
Kendall vein	369,000
No. 86 vein	36,000
No. 87 vein	10,000
No. 92 vein	12,000
Fourth of July vein	25,000
No. 96 vein	39,000
Total	\$1,016,000

As explained, the costs per ton mined and per ounce treated, were higher because of new work, developing, exploring and prospecting, and because of the increased number of small veins tested. Mr. Drummond also had a labor strike to contend with. The improved conditions now obtaining ought to materially reduce working costs when field parties are withdrawn and actual mining of the newer sections is proceeding.

Nipissing does not permit of the casual policy. Its capital precludes that; and its acreage, while large, has not disclosed those continuous ore bodies peculiar to the La Rose, O'Brien, Coniagas and Buffalo. Numerically, Nipissing's veins surpass those of the combined shipping properties at Cobalt. To determine how many of these connect with each other, extensive surface and underground work is now being prosecuted. The La Rose and O'Brien intervene between the southern and northern areas of the Nipissing; consequently there is reasonable ground for the assumption that the last has not been heard of Nipissing's position in the matter of veins.

To emphasize this, the situation at the Kendall workings, close to the McKinley-Darragh side line, may be described. This wealth-producer has Keewatin immediately on the west and conglomerate on the east. The Nipissing has the ore body in the conglomerate though at depth it is faulted somewhat on a diabase contact not yet satisfactorily defined. To the 55-ft. level, and along the strike of the Kendall vein for 225 ft., ore to the value of \$750,000 was extracted. This vein was found in June, a year ago. A low estimate values the ore taken out at \$90 per sq. ft.; there is said to be a million in sight where the drive is 130 ft. west and 155 ft. east toward vein No. 27. In the east drift the vein has a width of 3 ins. all the way; towards the west where the country is faulted, if the diabase encountered goes down, the ore contents of the Kendall section should be greatly augmented. About 290 ft. east from the present face of the drift a diamond drill located the vein, and there it carries 3,700 ozs. to the ton, which is a slight advance upon the average of the vein in the present workings. The first level has rich ore for about 135 ft., the east drift then being discontinued; and the west drift is 225 ft. in ore within 40 ft. of the McKinley-Darragh boundary.

From the Kendall first level, a cross-cut has been started south toward the Little Silver vein, Nos. 96, 86, 102 and others, situated on Little Silver hill, where very important discoveries have been made within a month or two. The formation here is not unlike that of Edge hill on the La Rose ground, and as

Silver hill lies to the south of the McKinley-Darragh, the section has possibilities. No. 96 has been stripped on the surface for 300 ft., and almost touches vein No. 102 at acute angles. About 100 ft. of this vein at surface yields from 5,000 to 6,000 ozs.; another 100 ft., 75 ozs.; all the vein matter being more or less decomposed. The remaining 100 ft. is low grade, but it is fully expected, judging from past experience, that values will increase. The purpose of the management is to tunnel so as to cross-section the hill. No. 102 has been exposed 400 ft. and a prospecting shaft sunk 15 ft. on 4 ins. yielded 300 ozs. At surface, the vein was more of a mud than anything else and went 90 ozs. South of these veins, on the same hill, are Nos. 86, 87, 88, 89, 90, 9 and 14, all running parallel—N. E. S. W.—from 20 to 60 ft. apart. These are regarded as of the same series as those of the Provincial mine. At No. 86, which the Provincial mine is working, the Nipissing Co. extracted 120,000 ozs. silver from an open cut. Here a shaft has been sunk to a depth of 70 ft. from which level cross-cutting is being done to nearby veins carrying good values. Already the drift on No. 86 has recorded 2,200 ozs., the vein having a trifle more smallite, but being otherwise unaltered. The general plan for proving Little Silver hill, which is within a few feet of the Kerr Lake branch of the railway, and therefore very convenient, is somewhat the same as at Edge hill on the La Rose and La Rose Extension. Gophering around at surface is precarious where capital exacts regular dividends. By tapping this Silver hill section on a general level, cheap mining may enable the management to more profitably place larger tonnages in reserve, and sooner correctly indicate the intrinsic worth of the locality at which the provincial government of Ontario decided to have their official mine. The government mine and Nipissing developments will have a decided bearing upon the Gillies' tract, for which \$15,000,000 was once tentatively proffered. Vein No. 86 of the Nipissing being of the Provincial mine series, there is urgency for more co-operation between government and the industry. At any rate, between the government mine and the Kendall vein, Nipissing has to the west of Cart lake a section well worth the exploitation it is undergoing. East of Cart lake, and extending over to and around Peterson lake, which is being proved by leaseholders, the Nipissing has more country; but will have to wait. Victoria and Nova Scotia mines are being intelligently developed; the latter being a shipper. Not only are the Nova Scotia veins of import, but they are being correlated across Peterson lake to the west where the Little Nipissing Co. on the lake shore has what it regards as the extension of Nipissing's No. 49, one of the richest in the field.

Leaving all of this Peterson and Cart Lake country to be further prospected, the testing done on R. L. 407 being unacceptable to the management, Nipissing perforce, is confining its field operations to R. L. 406, 404, 401, and the two halves

of 409, between which are the La Rose and Chambers-Ferland.

In a direct line, almost due east from the Kendall vein is No. 27, which it is proposed to connect with at the 145-level of the Kendall. A tunnel will eventually serve this entire district, picking up No. 44 and 19, and extending towards the No. 49 section, which it links up by means of a raise. This will constitute a central working area, the tunnel already driven on No. 28 from the Cobalt lake side, being in 1,150 ft., and having been connected by a 40-ft. raise with No. 49's 105-ft. level. Of No. 27, which is in the conglomerate, near the Keewatin prevailing in the center of the Nipissing ground, it may be said it is an unknown quantity at the present writing. Formerly it was stoped, and the management has been given to understand that once the workings are dewatered there will be ready for mining the same character of ore as at the Kendall. It is reported that the vein at the bottom is 20 ins., coming towards No. 27 from the northeast at an angle of 45 degrees. Vein No. 19 found in the conglomerate, and followed into the Keewatin, comprises two small stringers at the 140-ft. level, where cross veins were encountered running at right angles, and a crosscut indicated 1,000 to 1,200 ozs. silver, some of it in slabs. Nearly \$1,000,000 worth of ore was mined, and stoped from these workings, the stope being 120 by 40 ft. Work on No. 19 and No. 27 was suspended, pending completion of the tunnel system. Veins Nos. 6 and 7, which are really the same as No. 19, have been worked. At surface No. 6 was the best showing on the property. Great slabs of silver and nuggets were the objects of curiosity. An open cutting 25 by 55 ft. is about all that was done at this stope. There is one in the bottom of the cutting. This is considered one of the best of Nipissing's prospects. Furthermore the wall-rock carries values.

Veins Nos. 1, 2, 3, 4, 5, 17, 22, 24, 42, and others are all connected or soon will be. The open cuts disclose silver contents. No. 42 Mr. Park pronounces "a particularly nice one," and 22 and 24 have considerable ore, all in the Keewatin. They, too, are part of the big tunnel scheme, which also takes in 25, 54 and 55. Ultimately Nos. 12, 13, 15, 40, 50, 51 and 52, all in a bunch, in the Keewatin, toward the diabase contact on the Peterson lake side, will be linked by tunnel. In fact they are more or less so now. Prior to that, shipments of \$50,000 each were made from Nos. 13 and 15 from the first 70 ft. From 70 ft. to the surface at No. 49 about 175,000 ozs. were extracted and ore is in place at the bottom, in strength approximating that at No. 26.

Of course No. 49, midway on the ridge between Cobalt and Peterson lakes, has the record for production in the Nipissing books. On July 1 the reserves there were valued at \$225,000, and at that time \$120,000 had been taken out of No. 49 from an open cut 200 by 50 ft. Drifting is being done at the 105-ft. level to connect with Nos. 54 and 55. The strength of the veins in this locality, and the output thus far, apparently make for comparative permanence. At this writing, a disturbance at No. 49 is being examined.

The management is not prepared to admit that there is a fault; they regard it as quite likely that they have a fault to deal with, but whether the movement was horizontal or upward they cannot say. The slip which came in, cutting out the ore, has been projected, but if fault there be, those in charge reckon it as a matter of quick determination, in view of the uniform character and values of Nos. 25, 54 and 55. On the other hand, if, as has been suggested, No. 8, which possesses strength and values akin to No. 49, is the same fissure as No. 49—and No. 8 was faulted similarly—it would denote a throw of about 535 ft., which is believed to be out of the question, considering the normal conditions prevailing in the surrounding veins, as well as in the country rock. At any rate, the management is driving straight ahead to tap vein No. 54, and also crosscutting in the footwall of the supposed fault to the south. As soon as this knot has been untied and the workings have progressed sufficiently a winze will be sunk on the ore showing in the bottom of the drift, which is at 325 ft. to the east of the shaft. Before the slip or fault was encountered, No. 49 had 18 ft. of a shoot, 4 ins. wide, going from 3,000 to 4,000 ozs. to the ton. The intention is to stick to a calcite seam, traveling in the fault, in the hope that it may be the

vein, then to crosscut in the wall of the fault. The area stope there had only one insignificant "pinch," and the conjecture is that this may be another. However, Nos. 54 and 25 nearby are producers, and some day the relationship between a lot of these, No. 49 and the Kendall, may be solved.

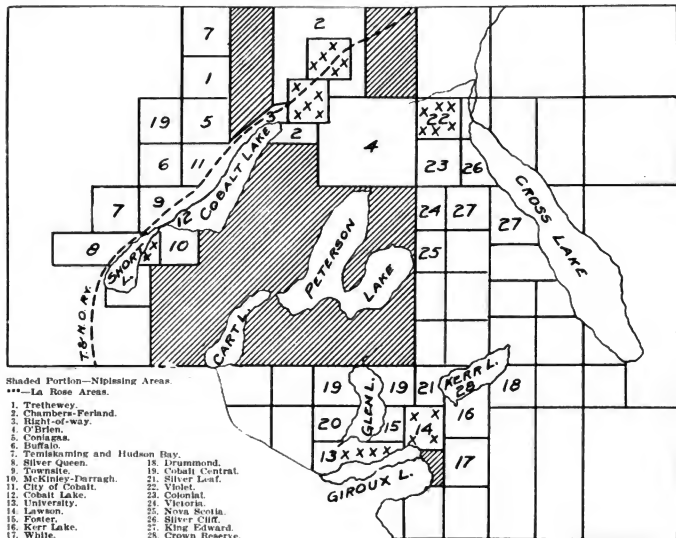
Close to the Chambers-Ferland southeast corner post, Nipissing has a useful unit in vein No. 26, upon which there is a shaft, and where three levels have been opened at 50, 110, and 210 ft. This is situated in the Keewatin, and again demonstrates the virtues of a diabase contact in proximity. The vein is pronounced to be "as good as any little vein in the country," carrying as it does from 4,000 to 6,000 ozs. silver, a distinctive feature being masses of wire silver. At the 110-ft. level, there is a 60-ft. shoot of very rich rock, 8 ins. wide and making the ore available above the level worth \$200,000. Evidences of faulting are again confronting the management, but the two shoots noted at the first level evidently are unaffected at the second level, although one of them has yet to be passed through. About 2 ft. of wall rock is heavily mineralized, and this section is very likely to increase Nipissing ore reserves.

In the northeast corner of this area, striking towards the Chambers-Ferland

fraction, there are several veins with a northwest-southeast strike, whereas most of the others on the Nipissing premises travel east-west or northeast-southwest. High grade ore has been found in places. No. 65 in the Keewatin runs off toward No. 26 and in a northerly direction its extension is probably No. 60. A crosscut at No. 26 should uncover the southeastern extension of No. 65, which is low grade where exposed for a distance of 500 ft.

Across the country at Cobalt lake, and midway on its eastern shore line, Nipissing has another group of veins. As explained, the tunnel was driven on No. 28, which is a stringer. At No. 81, running at right angles from the lake shore, and curving toward the "Old Cobalt" vein, a shaft has been sunk, and a station is being cut at the 75-ft. level where a crosscut will intersect the vein. At surface this vein, situated in the conglomerate, where exposed for 175 ft., had an average width of 12 ins. It was low in silver and high in cobalt. The Cobalt Lake Co. has a level on this vein, at 85 ft., where some stopping was done up to the Nipissing line, and where high values are said to have existed, as high as 2,800 ozs., the vein being 30 ins. The Nipissing people do not make this statement of their own knowledge. They are about to prove

COBALT'S CENTRAL AREAS AND PRODUCING COMPANIES.



their section of the vein. As for the "Old Cohalt" vein, it is a reminiscence, having petered, or faulted, out of existence. It served its purpose when Hibert found it, then located the Little Silver, subsequently starting the Nipissing Co. on its career.

A month ago Nipissing ground that had previously been trenched and retrenched, lying against the Coniagas, Trethewey and Hudson Bay properties, came into prominence. It is very apt to continue there, in excellent association with the companies named. Formerly the "Meyer," Nos. 98, 80, and the "4th of July" were about all of consequence the northwest part of R. L. 400 and the north half of R. L. 401 had revealed. The position was defined by Mr. Earle at the last annual meeting, when he said that the Fourth of July vein, "as exposed on the surface, shows very rich ore, and there is every reason to believe it will develop into a good producer, and that many other valuable veins will be found in this vicinity. During the year a shaft will be sunk on the Fourth of July vein and crosscuts will be driven north and south, the former of which will eventually connect with the Meyer shaft workings. All of the ground upon which the squatters are now located, by reason of the proximity of producing mines to this company's property, and the geological characteristics which are favorable for ore, is most valuable and is very likely to develop under systematic working into a large producing mine."

Pursuant to this, vein No. 64, an extension of the Temiskaming and Hudson Bay silver bearer in the Kewatin, has been proved in Nipissing ground, and it may connect with No. 98, in which event the locality would at once rank with its neighbors. While trenching the vein was located 3 ins. wide and yielding only 90 ozs. silver. The Meyer vein, No. 73, is 5 ins. wide and yields 3,500 ozs.; the Trethewey has it at 150 ft. Some cross cutting is contemplated there, and a central plant will be established at the Meyer shaft. At the present time, veins Nos. 80, 100 and 101 are the objects of attention because the discoveries were made by prospectors in already prospected ground, and because a portion of Cohalt's population will have to move, the veins lying in a residential district. No. 80 was located only a short distance from the Coniagas boundary, where it will be another valuable acquisition. No. 100 is almost alongside of it and has values of 3,500 ozs. and over. No. 101, between the Fourth of July and the Meyer, was located simultaneously with No. 100 and both favorably compare with the ore bodies of producing properties on the Trethewey-Coniagas ridge. When more work has been done and the diamond drilling provided for is finished, a crosscut may be run from the town. A half dozen shafts are now being sunk, one of them in search of the LaRose-Right of Way main vein, which swings across the railway track.

In the matter of plant, the Nipissing is fully well equipped. Last year extensive additions were made, and now there are two power stations, whereas one central plant is the objective of the manage-

ment. There are two 37-drill compressors, the latest being at the Kendall area, with 250-hp. boilers, a 250-hp. high-speed Robt-Armstrong engine, a 200-kilowatt motor to operate the hoists, pumps, etc., at several shaft houses. At the Peterson Lake power plant, these details are duplicated. Thirty drills are in use. From the power plants the Nipissing premises are lighted throughout by electricity. Machine shops and drill sharpeners effect economies necessary where labor is not as efficient as it might be.

Nipissing, as mining men see it, deserves all the care it is now receiving if it is to have adequate ore reserves and the number of mines possible in its extensive areas. To have paid out \$350 per ton shipped, to shareholders, at least \$150 per ton for mining, freights, treatment and administration, and to have two years' dividends in cash, cash assets, and ore "in sight" is an accomplishment of international mining note, considering the difficulties. In another year Nipissing will have redeemed one-half of its capital. The company which does that—where financing was joyously and generally "unconfined"—in four years of prospecting and three years of mining, cannot be deprived of commendation earned, however much there was to criticize.

Throughout this visit to the Nipissing General Manager Watson displayed the utmost courtesy and frankness. Whatever there be of public interest at the Nipissing is available for publication.

There is no better or more gratifying evidence of the altered policy at the Nipissing-La Rose group of mines than the readiness with which Mr. Watson has furnished the analytical figures relating to the complete shipments for the months of June and July, since the new regime took hold of the La Rose. At other fields, notably the Rand, analysis of output is volunteered from month to month. Cohalt had to have its lesson—and is tardily doing so—consequently the following from Mr. Watson will be appreciated by mining men and shareholders:

"August 30, 1908.

"Dear Sir: In answer to your letter of the 15th regarding the preliminary statement of earnings at the La Rose mine for June and July. Silver was secured at 72 cents per ounce, so that it cost \$56.42 to produce a profit of \$210.196, the total value of the ore therefore being \$266.648 gross, making the production at the rate of \$134.008. The item of cost here stated covers crushing, mining, metallurgical and for marketing."

"The smaller deduction and the smelting and freight charges, which make up the marketing charge, amount to 31% of the gross value, the mining expenses amount to about 8%, making an actual total of 14.3%.

"In the two months to which your enquiries are directed, there was produced 242 tons of high-grade ore averaging 242 ozs. per ton, also 561 tons of low grade, averaging 142 ozs. per ton and country rock included table screenings, cobblers and country rock in lumps from the McDonald and the No. 2 veins."

"The high grade netted \$197,000, so you will see that this was all profit, that amount really being increased to the extent of \$12,000 additional, the balance remaining from the proceeds from country rock, screenings and lumps over and above the total expenses of \$25,000 per month for the two months."

"These figures are more or less approximate for the foundations of the cars shipped the latter part of July have not arrived and the results are estimated on the mine sample, but they should not vary far from the final results."

"Very truly yours,

"R. B. WATSON."

## Zinc Ores of Butte.

La France Copper Co. of Butte, Mont., is experimenting with the Steele dry process zinc separation, and it is hoped that the method may prove a success. In a small way at an experimental station in Texas the system works perfectly, but like so many other processes it failed when put into actual and constant use. The trouble seems to lie in the complexity of the Butte zinc ores, and in the high percentage of minerals that are lost in the dust from the plant.

The ores carry zinc, lead, iron, copper, gold and silver, and the percentage of either is not high enough to make it profitable to mine the ore for either zinc or lead, with the other associated byproducts. However, the combined value is high, probably three times that of ordinary copper ores.

The cost of transportation and the high charges made by the zinc smelters are other reasons why the zinc ores can not be mined profitably at present. The smelters demand that the concentrates run a certain percentage of zinc, and to bring the product up to that point increase the loss by dust. The ore carries a lot of gold, but the zinc smelters will pay only \$9 per ounce for the gold in the concentrates, the plea being that the gold is simply another hindrance to the zinc smelting and requires additional handling, the zinc smelter not being equipped for handling the gold.

While the management of La France has hopes of being able to perfect the dry process, it is likely that water will have to be added eventually to assist. It is feared, however, that until a zinc smelter is built at Butte the zinc ores can not be mined at a profit because of the high charges elsewhere. Several years ago the Montana Copper & Zinc Co. tried another dry concentration method at the Alice mine and it proved a success on a small scale, but as soon as an attempt was made to operate it on a large scale it failed because of the increased care and attention that was required and could not be obtained from the ordinary workman, a big force of high class, scientific men, being too expensive. Before its plant was destroyed by fire the company changed its system by the introduction of a partial wet method of concentration.

## Cement Making Machinery Wanted.

An American consul in the orient reports that, in consequence of the continued expression of the manufacture of cement in his consular district, there appears to be openings for the sale of American machinery for grinding, sifting, and drying cement. The rapid completion of the enlargement of one plant is expected and other factories are contemplated. Machinery for the new installation, as well as for renewals, will be required. He gives the names of some American firms having agencies in the district that may be communicated with in regard to the sale of such machinery. Complete information can be obtained by addressing No. 2517, Bureau of Manufactures, Washington, D. C.

# How to Make an Inexpensive Gate of Poles

By MATT W. ALDERSON.

Prospectors in mountain regions are frequently so situated that live stock



MATT W. ALDERSON.

range in the vicinity of their "log cabin in the woods." Few things can make themselves more of a nuisance around a house or spring than a lot of cattle or sheep. One may be much annoyed unless he puts up a fence around his place to keep them out. When a place is thus fenced, many

persons put in bars for the entry, or crawl through between two fence poles, left a little wider apart for that purpose. But a very simple gate may be made without any expense except the labor; and a gate is always a convenience. Many is the farmer in the west who makes life a burden to himself by having bars where he should have gates. The time spent in taking down bars and putting them up again during a few particularly busy days would put gates in their places.

Of course, the farmer has the privilege of working sixteen hours a day, while the miner is limited to eight. It would seem, therefore, that while time to the farmer does not cut much of a figure, it is too valuable to the miner to be put in taking down and putting up bars. And yet, one often sees a mine situated up a gulch across which fences are run, fencing in pasture so that animals may get to water and range out on both sides, with bars where the road goes through the enclosure. When ore is hauled out, the driver must get down off a high wagon, go ahead, let down the bars, drive through, go back and put bars up, and then go ahead to his wagon. Suppose for two pairs of bars this takes seven or eight minutes of his time on a trip. Four trips mean half an hour a day, or an expense of 50 cents or more. There are many places where bars are an expense of \$10 or even \$20 a month, and yet men are so constituted that once the bars are up they are allowed to stand. We bear with the inconvenience today, not thinking of how much it costs us.

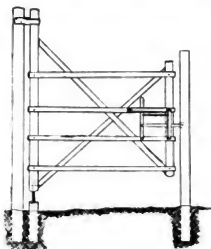
A sketch herewith shows a very simple gate made of light poles. If lumber is plentiful, 2 by 4's may be used for uprights and 1 by 4's for the cross pieces. This will make a gate which, large or small, is easily handled; and, when well put together, is sufficiently strong for every possible purpose. Where, however, for any possible reason a gate must be extra wide, as for wagons with hay racks or wide wood racks, it may be well to use a 4 by 4 for the upright on the hinge side.

The simplest and best hinge for a gate is the least expensive. For a small gate, take a short piece of bar iron  $\frac{3}{4}$  to  $\frac{1}{2}$  in diameter, six or eight inches long

*A light strong gate, easily made and put in place, has many advantages over cumbersome bars, too frequently used instead.*

*Simple directions for making a gate of poles or other light material and for setting it up so it will work easily and to best advantage.*

For a large gate, use a piece an inch or more in diameter. Bore a hole in the foot of the gate upright on the hinge side and drive this bar in until one end projects out about 2 ins. There will be no harm if it projects out more. Drive a block into the ground into which bore a shallow hole for a socket, a little larger



A Gate Made of Small Poles.

than the iron, so it will turn in the socket easily. One may round off the bottom of the upright and round out a socket in the piece that goes into the ground, but to use a piece of iron is preferable. And such a piece as is needed can be picked up around almost any blacksmith shop. For the top of the upright on a small gate, use a piece of ordinary hoop iron. For a large gate a piece of strong band iron should be used.

The post from which the gate swings should be set well into the ground, or be well braced, so it will hold its position. It should preferably be slightly out of plumb, so the gate will have a natural tendency to swing shut. For a large gate the block which serves as a part of the lower hinge should be set into the ground with the post and be tamped so it will hold its place.

The hinge described always works well and by placing the upper hinge a few inches above the brace, where it is attached to the gate on the hinge side, the gate may be lifted out quickly at any time. This is often an advantage in regions where there is heavy snowfall or where the gate is so situated that it may

be clogged by drifts. One may lift the gate out and set it aside at such a time and set it back in place at one-tenth the labor that might be necessary to shovel out so it would swing clear.

Preferably a small gate should strike the post against which it closes. Then with a weight on a wire or other string to some fixed object, the gate will swing shut of itself, thus saving time necessary to fasten it when passing through. But large gates nearly always need to be fastened. It is often a great advantage to have the gate swing either way and a simple fastening for a gate so hung is shown in the illustration. A sliding strip is so arranged that it has a play of 1 in., with a spring to throw the strip forward. The outer end of this strip has its edges slightly rounded, so that, as it strikes the post, it will spring back; and, as it comes opposite a slot in the post, it will spring in. If a person passing through lets the gate take its natural swing, it will strike the post gently and fasten itself. Another simple arrangement is a clevis on the post, the bolt of the clevis going through the post and the U part of the clevis dropping down over the upright of the gate.

Persons making gates of poles often make them several times heavier than they need be and the gates thus become a drag and are soon out of shape because of their weight. Poles having a diameter of two inches are sufficiently heavy for all parts but the main upright. Where the butt is larger than 2½ ins., it should be hewed down. Make the gate light. Peel the poles and the gate will present a very neat appearance. Put it together with nails sufficiently long to go through and clinch or with small bolts, and the gate, with proper care, will last a lifetime.

## Exploitation of Colombian Oil Fields.

An American company, composed of Beaumont, Tex., capital, has entered into an agreement with the Colombian firm which held the concession for the exploitation of the oil fields of Cartagena and the refining of petroleum. The rights cover various tracts of oil-bearing lands amounting to 12,000 acres, partly near Turbaco, 15 miles from Cartagena, and partly in the valley of the Sinu river. Excellent prospects have been found in both places, and arrangements are being made to begin work. The company will install modern machinery and sink a number of wells to demonstrate the character of the deposits, and if successful in finding oil in paying quantities will proceed to develop the properties and to place the product on the market.

**Pig Iron Production.**—According to the American Iron and Steel Association the pig iron production of the United States in the first half of 1908 was 6,318,004 gross tons, against 12,303,317 tons in the last half of 1907 and 13,458,044 tons in the first half of 1907.

### Drilling vs. Shaft Sinking.

BY WILLIAM R. WADE.\*

The Azure Mining Co. owns and operates in Burro mountains, New Mexico, the largest turquoise mine in the world. On the property is an open cut 750 ft. long, 60 ft. wide at the bottom, 150 ft. wide at the top and 80 ft. deep at the highest point, averaging around 60 ft. This mine also has over three miles of drifts, crosscuts, raises and shafts, having five different levels. Very large stopes have been mined out below the open cut. At present the turquoise production is small, as the company has turned its attention to copper.

There are two classes of copper deposits in these mountains, one, fissure veins of the replacement type in granite

and decided to explore their tracts of monzonite porphyry and other lands. We decided that as the ore bodies in the porphyry generally dipped less than 45 degrees and were of large extent, a drill would be the best method, both as to speed and economy for discovering ore and determining whether it would pay to sink a shaft to further develop it. A good shaft of two compartments, 300 ft. deep, costs all told around \$15,000, and a thousand feet of drifting and crosscutting from this shaft would bring the expense close to \$30,000. If this shaft has a cross-cut from its bottom 500 ft. each way it would develop 1,000 ft. of ground. Now a row of drill holes placed 150 ft. apart, each 300 ft. deep, will develop the same territory. Figuring \$1 per foot as cost of drilling (as a matter of fact we churn drill for about 50 cents and wages are

much heavier, and this is generally necessary to lay out a mine.

The machine we are using is a No. 4 Combination, using cable, hollow rods, and core attachment. In hole No. 1 we used the cable tools to 150 ft., making a 4-in. hole; put on the core attachment, took a few feet of core which cut a 3-in. hole, found out the kind of rock we were in, filled the hole up with hard pebbles to the bottom of the 4-in. hole, put down our cable drill and reamed out the 3-in. hole and continued drilling. We can cut 30 ft. per 8½ working hours of 4-in. hole with the cable tools. We assay the mud that is pulled up with the sand pump. While chalcocite slimes badly we prevent loss of values by using very little water and keeping the mud thick. We encountered good ore at 235 ft. in our first hole, which was encouraging. We shall churn most of our holes, putting down a few core holes at 400 to 500 ft. intervals.

We move from hole to hole by using the hoist on the drill. Six barrels of water and three-eighths of a cord of juniper wood (equal to pine, cedar or similar soft wood in fuel value) is what we require.

The writer would point out that the costs for sinking, drilling (\$1 per ft.), etc., include interest on all machinery, repairs, costs of assaying, superintendence, etc., not just the bare cost of actual labor. The 50 cents per foot for drilling is, of course, for labor, interest on drill, supplies, and allows \$1 a day for repairs, but does not include office expenses, superintendence, assaying, etc. We use a crew of three men, as we find the work goes faster.

In the monzonite porphyry, where we are working at present, a 350 to 400 ft. hole is deep enough to show the ore. The machine is equipped for 700 ft. complete in all three systems of drilling, and the writer is convinced the engine and boiler have ample power for that depth. The boiler is a rapid steamer and has the safety valve blowing half the time.



Cyclone Combination Core Drill at Work.

and along contact lines of granite porphyry, and the second and more important class, which are lenses of secondarily enriched ore in the monzonite porphyry. These lenses are low grade character ore, averaging between 2% and 3% copper, and practically barren of gold or silver. The ore, however, is free from arsenic, bismuth and all such impurities. The lenses vary greatly in size after reaching 150 to 200 ft. in width and a length of 500 to 700 ft. The extent or position of these lenses is not indicated on the surface, the only indications being a leached iron stained porphyry with occasional surface stains and pockets of carbonate ore too low grade and small in extent to be of value.

The Azure Co. has developed one of these fissure veins with a 400 ft. shaft,

\*Consulting Mining Engineer; Superintendent Azure Mining Co.

high in this country), we have \$2,100, and adding \$2,200, the cost of our machine fully equipped laid down here, we have \$4,300 doing the work of \$30,000. This applies to practically only one 30 acre claim. We have about 800 acres of mineral land, a great deal of which contains copper. Of course, it can be said if the shafts and crosscuts hit ore, they are afterwards of use, while the drill hole is not. Suppose the ore is encountered 800 ft. from the shaft, then we have \$15,000 for shaft and \$12,000 for crosscutting. With the ground drilled first the shaft could be placed near the ore in the foot wall, and we have \$15,000 for shaft, \$1,000 for short crosscuts and station and \$1,200 for drilling, or a total of \$20,200, making a saving of nearly \$10,000. It must be remembered that when two or three levels are developed, with the shaft a long way from the ore, the expense is

### India's Gold and Silver Coin and Bullion.

According to Consul General William H. Michael of Calcutta the amount of silver held in the paper currency reserve in India June 15, 1908, was \$86,400,000, gold coin and bullion \$6,766,665, and silver bullion under coinage \$28,000,000. Gold coin held in the paper currency reserve in England, \$13,500,000; the silver held in gold standard reserve, \$20,000,000 (the permanent nucleus of its silver branch), and \$14,266,665 paid into the reserve out of the proceeds of sterling bills drawn on the secretary of state, exclusive of \$6,633,330 held in deposit on account of further bills drawn but not yet presented for payment in London.

**Western Australia's Gold Yield.**—The gold yield of Western Australia for July amounted to 183,423 ozs. This result is encouraging, as it shows an increase of 4,868 ozs., compared with the yield in July, last year. The total yield to date amounts to 19,321,229 ozs., valued at £2,084,100.



# Concentrating With Hydraulic Jigs in Sardinia.

By **ERMINO FERRARIS,\***

*Metallurgist.*

The method described is in use at the calamine works at Monteponi in Sardinia.

Concentration of grains from 10 to 30 mm. is effected by hydraulic jigs with two compartments, and in the case of the smaller grains down to 2 mm. by jigs with five compartments.

The construction of the jigs is the same in both cases. Fig. 2 gives the details of a jig with two compartments; it is formed of three cast iron plates, which support the bearings of the ec-

*Two kinds of hydraulic jigs employed. Features of construction, and differences compared with jigs in general use.*

for strokes up to 20 mm.; a second for strokes between 10 and 40 mm., and a third for strokes between 30 and 80 mm.

With five holes in each partial eccentric, 25 combinations of different strokes can be obtained between the two extremes. The superiority of the system consists in the facility with which the eccentricity can be regulated, and in the assurance that this eccentricity cannot vary during the work of the jig. This eccentricity is shown in Fig. 1.

The discharge of the concentrated material is made by pipe for the coarser grains; by pipe and suction through the sieve into the hutch beneath for the sands. The pipe varies in diameter from 13 to 51 mm., according to the classes treated. It is placed, slightly inclined towards the outside, and transversely to the screen, at about half the height of the layer of grains. On the bottom of the pipe, in the middle of the screen, a hole is bored, through which the grains with the water rise through the pipe and flow away.

The jig separates the grains in layers of different density. The pipe gives an outlet to the layer of valuable mineral as fast as it rises on the screen. The discharge is made at intervals, especially for the small grains, and is stopped when waste is found mixed with the ores.

In jigs treating grains larger than 10 mm., the ore falls on sorting tables of perforated iron sheets. The jigs have two discharge pipes, one for each compartment, and the division between the compartments is raised only as high as the pipe, to allow free movement to the upper layer. The first pipe discharges principally a mixture of galena, barite and cerussite; the second discharges smithsonite and calamine. Sorting on the outside tables gives finished products.

The jigs with five compartments, for sands between 2 and 10 mm., discharge at the same time by pipe discharge and hutch. A bed of iron disks—spread on the screen gives the resistance necessary for the separation of the sands and secures the continuous production, above the bed, of a layer of ore, which is forced out through the pipe discharge as it is

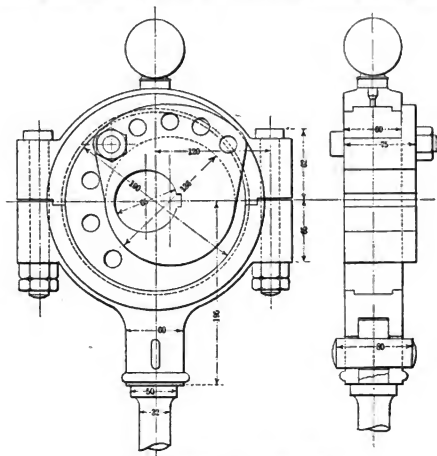


Fig. 1.—Eccentric of Hydraulic Jig.

centric shaft, joined by a wooden casing or wooden walls so as to form two communicating chambers for pistons and screens. This construction has no special advantage beyond facilitating the transportation and mounting of the jigs. But in some details the Monteponi jig differs greatly from those in general use.

The eccentrics have a variable stroke. A first eccentric fixed to the shaft is surrounded by a moving eccentric; the first has a flange which partly covers the second at the side, and both have holes through which the bolt is passed to hold them together. The holes being at a different distance in the two eccentrics, the combination forms a kind of vernier caliper, which allows variation in the eccentricity.

Eccentrics of three sizes are used: one

DETAILS OF CONSTRUCTION OF JIGS AT MONTEPONI.

Class treated, mm.....	Jigs for Coarse Grains (2 compartments).			Jigs for Sands (5 compartments).			
	20-30	14-20	10-14	7-30	5-7	3.5-6	2-3.5
Free width of compartments, mm.....	450	450	450	450	450	450	450
Free length, mm.....	750	750	750	500	500	500	500
Diameter of the holes in the screen, mm.....	10	8	6	10	8	6	4
Diameter of the iron disks which form the bed, mm.....				12-16	10-14	8-10	5-8
Stroke of the piston, mm.....	40-50	35-45	30-40	20-35	20-30	16-24	15-20
Number of strokes per min.....	100	110	120	125	130	150	180
Approximate clear water per min., liters.....	140	100	75	50	45	40	40
Power consumed, h.p.....	1.25	1.1	1	1.5	1.5	1.5	1.5
Material treated per hour, kg.....	500	450	400	300	300	300	300
Diameter of the discharge pipes, mm.....	51	38	32	25	20	16	13.

\*Extract from *El-min. Ital.* A. I. M. E. May, 1908.



formed. To close the spigot, a stopper of some sort is employed, or else a lend, which can be turned upwards when it is desirable to stop the outflow.

The screens have perforations larger in diameter than the maximum diameter of the sands, and the products from the pipe and from the hutch of the same

### Germany's Mineral Industry.

BY WALTER A. LEONARD.\*

The development of the German mines has taken place mainly within the last twenty years. In 1889 the 100,000,000 mark had not been reached, and since 1895 the total amount of products from

Considerably more lignite is claimed to exist in Germany than in any other country, and the increasing output of the same in recent years, compared to coal, can be seen from the following table:

Description.	1895. Metric tons.	1906. Metric tons.	1907 Metric tons.
Coal	79,169,000	137,118,000	143,168,000
Lignite	24,738,000	54,413,000	62,359,000
Total	103,957,000	191,531,000	205,527,000

Notwithstanding the fact that during the last twelve years the supply of coal in Germany has nearly doubled, the market price, instead of decreasing, has advanced nearly 50%. Working out an average price at the mine it is shown that coal has advanced from \$1.62 per metric ton in 1895 to \$2.32 in 1907. The price of lignite has not perceptibly advanced, being 56 cts. per metric ton in 1895 and 60 cts. in 1907.

The ores mined in 1907 amounted to 29,610,000 metric tons, against 28,620,000 tons in 1906. Of this amount 27,700,000 tons in 1907 and 26,730,000 tons in 1906 were iron ore. The average price of a metric ton of iron ore was 3.84 marks (\$0.91) in 1906, against 4.3 marks (\$1.02) in 1907.

The quantities and values of the other ores taken from the mines in 1907 were as follows:

Ores.	Metric tons.	Value.
Zinc	698,425	\$10,065,734
Copper	771,227	6,304,420
Lead	147,732	4,791,412
Pyrites	196,320	409,836
Gold and silver	8,280	247,588

Arsenic, manganese, bitrol, and alum are also mined in Germany, but only in small quantities and values.

The production of salt in 1907 was over 7,000,000 metric tons, with a value of \$17,324,020. Mineral salt (rock salt) amounted to \$305,863, and salt peter (nitrate of potash) to \$1,268,349.

While the amount, in tons, of mining products has approximately doubled in the last twelve years, the value of the same has advanced more than two and one-half times, or, more accurately figured, 161%. Tracing the increased products and their value since 1895, we have the following results, reduced to metric ton and American currency, respectively:

Year	Metric tons.	Value.
1895	120,294,000	\$168,147,000
1900	174,667,000	300,641,600
1905	205,592,000	337,417,600
1906	227,146,000	389,629,800
1907	242,609,000	439,086,200

In further studying the development of the mining industries it is an interesting fact to note the tendency toward combinations of capital, thus reducing the number of mining companies. This is shown by the following table, making a comparison of the years 1873 and 1903, the latter date being the last one for which figures are available:

Description.	1873.	1903
Number of mining companies	4,313	1,542
Average output of each company (tons)	12,522	110,410
Total number of workmen	289,756	661,210
Workmen to each company	67	35
Capacity of output for each workman (tons)	186	311

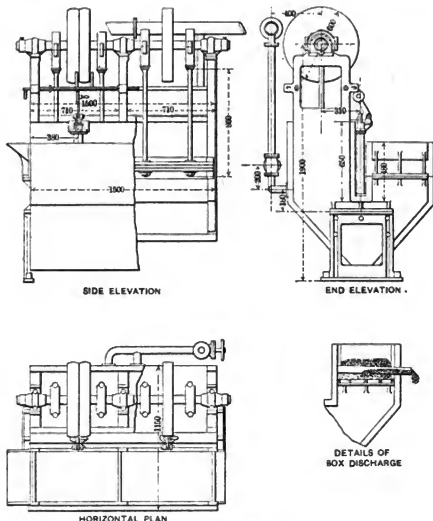


Fig. 2.—Two-Compartment Jig.

compartment have nearly the same composition.

The table on previous page shows the principal features of the jigs in use at Monteponi.

All these jigs are directly fed by the vibrating screens and perform continuous work. The mixed products from the jigs for sand—for instance, the mixture of galena, barite, cerussite, and smithsonite—are separated by closed jigs, with one compartment of 0.45 to 1.20 m. free surface of screen, giving beds of different ores, which can be removed by hand at intervals.

A mass of ore 2 by 4 ft. and 8 ins. thick, three-quarters of which is native silver, valued at about \$2,000, if sold for its metallic content, but as a specimen at double this valuation, has been taken from the Kendall vein of the Nipissing Mines Co. at Cobalt.

the mines has more than doubled. During 1899 and 1900 the increases were especially noteworthy, and in 1906 it rose to 227,000,000 tons and in 1907 to more than 242,000,000.

The most important branch is coal mining, the same representing about 85% of the total products of the mines. In Germany it is customary to divide coal into two great classes, based upon differences in color rather than hardness, viz., brown coal (braunkohle), corresponding to the English term lignite, and black, or stone coal (steinkohle), which is equivalent to coal as the word is used in the United States. Lignite has a composition similar to peat, usually with the addition of some animal remains, being a compact mass of plants, the degraded vegetable tissues making a paste-like formation which has not yet passed through a sufficient number of geological changes to have become coal.

\*American Vice-Consul at Kehl.

### Alaska's Great Coal Reserve.

The question of the conservation of America's natural resources is not a new subject. The drain upon the resources and the necessity for their economical utilization were recognized by many who made a study of them long before their probable exhaustion had been reduced to terms of decades and years. In a recent statement the U. S. Geological Survey estimates the total exhaustion of easily mined coal, at the present rate of increase in production and consumption, as likely to occur in the century following the present one, providing new large coal fields are not in the meantime discovered. At the same time the Survey is doing its best to make just such discoveries as will upset these figures. Outside of the investigations of the coal deposits of the United States the Survey has for some years been making a study of the coal

visit in the northwestern territory. "We know that there is coal in this little explored area. Possibly there are large coal fields which will form an important part of the ultimate coal reserve of Alaska. The Cape Lisburne coal field represents the western end of what is probably a large coal area not yet determined. It is not impossible that the area of lignite and low-grade bituminous coal may be double the present known coal area in the territory, which is over 12,000 sq. miles. The coal of Alaska ranges in quality from lignite to coal that compares favorably with the famous Pocahontas of West Virginia. Some of the bituminous coals make good coke. Some of the coal seams of the territory are of great thickness. I have observed 'swells' in seams that were 60 ft. of solid coal."

Prof. W. A. Atwood, a geologist of the Survey, is this year finishing up in-

have not, however, proved of economic importance. In 1904 the geologic study of the Cape Lisburne coal region was commenced. This is a bituminous coal field containing soft coal that ranges from low to high-grade and at present its boundaries are only partially known. In 1904 Survey work was commenced in the large lignite fields of the Kenai peninsula.

The work of the Survey is thus being carried out along definite lines of determining the coal resources of Alaska not only with relation to local consumption but with reference to their effect upon the total coal reserve of the country. The work is of special importance and the showing highly satisfactory because of the comparative lack of large developed coal supplies on the Pacific coast of the United States proper.

"The Alaska coal field," said Mr. Brooks, "particularly those carrying a high-grade fuel, like the Controller bay and the Matsanuska fields, are destined to play an important part in the advancement of industry on the entire Pacific seaboard.

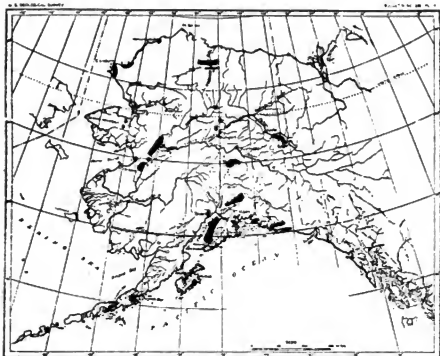
"The minable coal, in the ground, in Alaska, has not yet been definitely estimated, and whatever estimates are made, for some years to come, will doubtless be subject to wide expansion as further geological explorations are carried forward; but it is proper to say that the coal resources of the territory are very great and that they will be figured in hundreds of millions and even billions of tons."

### Coal Mining in Idaho.

The total production of coal in Idaho in 1907 was 6,508 short tons, having a spot value of \$36,494. Lignite beds occur in several areas in Idaho, but little mining has been done until within the last five or six years. The producing districts are the Horseshoe Bend and the Jerusalem, occupying the lower portion of a ridge between the Boise and Payette rivers; an area near Salmon City, in Lemhi county; and one at the eastern edge of the state, in Bingham and Fremont counties, where the Sublette field of Wyoming extends across the state line. The principal production in 1905 and 1906 was in the Salmon district, in Lemhi county, 4,380 tons having been mined there in 1905, and 4,285 tons out of a total of 5,365 in 1906. In 1907 Fremont county was credited with a production of 2,884 tons and 3,500 tons were produced in Lemhi county. Bingham county also produced a small quantity of coal in 1907.

The total production in the state in 1907 according to a report issued by the United States Geological Survey showed an increase of 1,143 tons, or 21.3%, in quantity and of \$7,956, or 42.92%, in value.

A Cantonese has obtained a concession from the Chinese government to work mines in Hainan near Hongkong. It has been known for some time that there are large deposits of gold, tin, coal, and iron in Hainan, and it is said that the concession is a valuable one.



Map of Alaska, Showing Distribution of Coal and Coal-Bearing Rocks, so Far as Known.

supply of the world and over six years ago began a definite examination of coal in Alaska. The result of the latter investigation has been an excellent showing of coal in that territory, a score or more of large coal fields being shown on the coal map just published in Survey Bulletin 335. The combined area of these fields is very great, although small in comparison with the immense area of the territory. Furthermore, it is not possible, even with the large amount of work accomplished that all of the coal areas of Alaska should be known by this time. Additional exploration and investigation may be rich in results.

"Fully one-fourth of Alaska, or approximately 150,000 sq. miles, is little more than an unopened book to us, so far as its precious and useful minerals are concerned," says Alfred H. Brooks, chief geologist of the Alaskan Division of the U. S. Geological Survey, just before leaving Washington for his annual

vestigation of Alaska coal preparatory to writing a summary of the present knowledge of the coal reserve of the territory, based upon his and other previous Survey investigations.

"As far back as 1902," continued Mr. Brooks, "the Survey began a systematic study of Alaska coal fields, commencing with a geological reconnaissance of the low-grade bituminous and lignite coals of the Yukon region. In 1902, 1903, 1904, and 1905 investigations were made of the Nenana fields near Fairbanks. In 1903, work was begun on the coal fields of the Controller bay region and in 1905 the Matsanuska field was studied in geologic detail. In these two fields there are 100 sq. miles of lands underlain by workable coals containing anthracite and bituminous fuels of the highest grade. In 1902 the Herenden bay bituminous coal region was studied by Survey geologists. In 1903 coal investigations were made of the southeastern Alaska coal fields, which

## Coke Production in 1907.

BY E. W. PARKER.\*

The total production of coke in the United States in 1907 amounted to 40,759,564 short tons, valued at \$111,539,126, a total that passes all previous records in the history of coke making in this country, being nearly double the output of 1906 and more than three times that of 1897. The increase over the production of 1906 was 4,375,347 short tons, or 10.02%, in quantity, and \$19,931,092, or 21.76%, in value. The average price per ton at the ovens—\$2.74—is greater by 22 cts. than the 1906 average and is the highest reported in the 28 years during which statistics of coke production have been compiled by the United States Geological Survey, exceeding by 11 cts. the maximum rate previously obtained in 1873.

Of the total production for the year 85,111,665 short tons, or 60.25%, was produced in beehive ovens, as against 31,813,690 tons of beehive coke in 1906. The production from retort or byproduct ovens during 1907 was 5,607,899 short tons, or 13.75% of the total, against 4,558,127 short tons, or 12.52% of the total, in 1906. The increase in production of beehive coke in 1907 over 1906 was 3,328,575 tons; the increase in the retort-oven product was 1,049,772 tons. It appears, therefore, that while the beehive coke increased 10.45%, retort-oven increased 23.05%. It also appears that 23.98% of the total increase in 1907 was in the output of by-product ovens.

The increase in production in 1907, with the larger proportionate increase in value, was due to the continued extraordinary demand in the iron and steel trade.

In considering the total value and average selling price of coke produced in the United States, it should be remembered that in many places the values are arbitrarily fixed. Many of the coke ovens in this country are operated by large corporations that operate also coal mines and blast furnaces, the coke making being really only an incidental part of the business. Under such circumstances the coke product is sometimes charged against the turnpike department at cost and sometimes at a figure based on the cost of coal mining and coke making plus a percentage of profit on these operations, so that the value is not fixed by the market price. Other companies base their estimates of value on the average prices for coke of similar quality produced and sold in the immediate vicinity.

The amount of coal consumed in the manufacture of coke in 1907 was 61,946,100 short tons, valued at \$72,784,851. As the value of the coke produced from this coal was \$111,539,126, the difference—\$38,754,275—less the cost of manufacturing and the expenses of administration and selling represents the profits on the coking operations. In 1906 the value of the coal used was \$62,232,524, and the value of the coke produced was \$91,608,034, the difference to cover all expenses of manufacture, administration, and profits being \$29,375,510.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects are being sent by mail to the Mining World. Each may be made by coin, stamps or postoffice money order.

WEEK, JULY 28, 1908.

**Separate Tooth for Power-Shovel Dipper.** Andrew H. Johnson, St. Paul, Minn., assignors of one-half to Rudolph Matak and William Matak, St. Paul, Minn. (894,175; filed Feb. 24, 1908.)

**Chain Link for Mining Machines.** David Buel, Columbus, Ohio. (894,184; filed Dec. 9, 1905. Renewed Dec. 19, 1907.)

**Rock Drill.** Henry J. C. Keymer, Glastonbury, Great Yarmouth, England. (894,213; filed Jan. 8, 1907.)

**Process of Extracting Precious Metals from Ores.** Isidor Kitzes, Philadelphia, Pa. (894,215; filed Aug. 24, 1907.)

**Clam Shell Bucket.** Frederick W. Lovell, Cleveland, Ohio, assignor, by mesne assignments, to The Meloy Manufacturing Co., Cleveland, Ohio. (894,219; filed May 14, 1904.)

**Cyanide Tank.** Ralph S. Browne, Alameda, Cal. (894,251; filed July 21, 1907.)

**Stone Crushing Machine.** Joseph E. Gray, San Francisco, Cal. (894,257; filed Feb. 11, 1907.)

**Treatment of Ores by Means of the Precipitation Process.** Antoine H. Imbert, Grand-Montrouge, France, assignor to Imbert Process Co., New York, N. Y. (894,253; filed Aug. 15, 1907.)

**Apparatus for Charging Furnaces.** Herman A. Prommer, Salt Lake City, Utah, and James R. Leach, Ardmore, Pa. (894,292; filed May 17, 1907.)

**Crucible Furnace.** Edmund Rankin, Lincoln, Ill. (894,293; filed Sept. 24, 1907.)

**Filtering Apparatus.** Elisha A. White, Guatemala, Mexico. (894,314; filed Dec. 17, 1907.)

**Treating Communitated Solids with Liquids.** Adair Johnsenough, Transvaal. (894,417; filed July 5, 1907.)

**Process of Raising the Elastic Limit of Metals and Relieving Them of Injurious Strains.** Robert H. Emery, Stamford, Conn. (894,423; filed Nov. 12, 1907.)

**Process of Making Pyrites Briquets.** Peter de Pyester, Ricksdale, and Tom C. King, New York, N. Y., assignors to National Metallurgic Co., Jersey City, N. J. (894,464; filed May 4, 1905.)

**Method and Apparatus for Utilizing the Heat from Cement Clinkers.** Tom C. King, New York, N. Y., assignor to National Metallurgic Co., Jersey City, N. J. (894,507; filed Mar. 13, 1905. Serial No. 749,745.)

**Coat Dumping Cage.** Harvey O. Pearce, Linton, Ind. (894,528; filed Mar. 17, 1908.)

**Apparatus for Manufacturing Nitrous Compounds.** Charles P. Strimmler, Schenectady, N. Y., assignor to General Electric Co., a corporation of New York. (894,547; filed Mar. 18, 1907.)

**Conveyor Bucket.** George W. Barnett, Louisa, Tex. (894,572; filed Oct. 13, 1906. Renewed Jan. 4, 1907.)

**Miner's Lamp.** Alfred Brile, Encampment, Wyo. (894,587; filed Dec. 29, 1907.)

**Apparatus for Oil Wells.** Linus W. Brown, Bakersfield, Cal. (894,590; filed Feb. 7, 1908.)

**Oral-Itger.** Ephie Cohen, Joplin, Mo. (894,604; filed Mar. 13, 1908.)

**Gas and Gasoline Engine.** Anthony F. Pittsburg, Pa. (894,622; filed Oct. 24, 1906.)

**Gold Separator and Amalgamator.** Charles H. Hall and John Eldridge, Astoria, Ore. (894,623; filed Feb. 11, 1907.)

**Method for Coking Hydrous Bituminous Combustibles.** Paul Hoering, Berlin, Germany, assignor to The Firm of Torfwerke Gesellschaft mit beschränkter Haftung, Berlin, Germany. (894,647; filed Dec. 22, 1903.)

**Explosive Compound.** Gustav Schults and Fritz Gehrle, Munich, Germany, assignors to Emilio Biecher and Carlo Lopez, Munich, Germany. (894,707; filed Jan. 25, 1906.)

**Hoisting Apparatus.** John D. Austin, Tacoma, Wash. (894,717; filed Sept. 29, 1907.)

**Desulfurization.** Pierre De Pyester, Ricksdale and Tom C. King, New York, N. Y., assignors to National Metallurgic Co., Jer-

sey City, N. Y. (Original application filed May 4, 1905. Divided and application 894,720 filed Nov. 29, 1905.)

**Apparatus for Mixing Concrete.** Alfred von Siller, Washington, D. C. (894,749; filed July 31, 1907.)

**Process for Smelting Ores of Iron.** Edward D. Kendall, Seward, N. J., assignor of one-half to E. N. Dickerson, Stovall, N. C., and one-half to Albert J. Seward, New York, N. Y. (894,756; filed Nov. 2, 1906.)

**Method of Preparing Pyrites Fines for** WEEK, AUG. 4, 1908.

**Miner's Drill.** Jacob Bieser, Springfield, Ill. (894,888; filed July 31, 1906. Renewed Nov. 19, 1907.)

**Apparatus for Treating Cement.** Oscar Gerlach, Iola, Kan. (894,823; filed Oct. 11, 1905.)

**System of Cleaning Filters.** Hiram W. Blaisdell, Los Angeles, Cal. (894,873; filed Nov. 16, 1904.)

**Gas Producer.** Melvin E. Crowell, Franklin, Ind., assignor of one-half to Franklin Fay Chandler, Indianapolis, Ind. (894,877; filed Jan. 14, 1907. Renewed Dec. 16, 1907.)

**Graphite Separator.** William M. Fuller, Crown Point, N. Y., assignor of one-third to J. C. Williams, Port Jervis, N. Y., and one-third to Milo M. Winters, Crown Point, N. Y. (894,879; filed Nov. 25, 1905.)

**Method of Recovering Copper from Ores.** William B. Potter, St. Louis, Mo., assignor to Emeralda Copper Precipitating Co., Chicago, Ill., a corporation of Arizona. (894,932; filed Aug. 1, 1907.)

**Liquid Fuel Burner.** John A. Willis, Palmer, Ore. (894,938; filed Nov. 11, 1907.)

**Blowpipe for Cutting Metal Plates, Pipes, and the Like.** Felix Jolanda and Primo Louis Jolanda, Paris, France, assignors to Société Anonyme L'oxyhydrogène Internationale, Brussels, Belgium. (895,056; filed Jan. 15, 1907.)

## Legal Decisions.

**Mining Claim: Discovery: Priority.**—One person located and staked a placer mining claim on May 25, but made no discovery of gold until after the first locator had got supplies and necessary equipment to proceed with the development work. In the meantime the second locator located and staked the claim, and when the first locator returned on June 9 he found the second and third locators in possession. The first locator entered peacefully on June 29, built a cabin thereon and proceeded to sink a shaft. During the same time the second locator remained on the claim living in a tent and was engaged likewise in sinking a shaft. The first locator found sufficient gold in the shaft sunk by him to warrant him in the further expenditure of time and money in the development of the claim. The location made by the first locator on May 25 uncompensated by the second locator, gave him no right subsequently to return and take possession of the claim after the second locator had made due location and taken possession for the purpose of exploration. But both locators being in possession consented on and after June 8 it became a race of diligence between them to discover gold, and he who discovered it obtained the claim. While his discovery did not relate back to the date of his location, yet his location was the basis upon which his discovery was effective from that date and gave him the full right to the claim to the exclusion of all others.—Johnson vs. White, 160 Fed. 901.

**Oil and Gas Lease.**—An oil and gas lease which gave the lessee the right to drill for oil and gas and which compelled the lessee to furnish free gas to the lessor and to pay a certain sum annually during the term of the lease and which provided that the lease should be sold and which payment should be made within a certain number of days, after commencing the use of gas for fuel and for other purposes, was held not forfeited by the mere failure to pay the stipulated royalties.—Davis vs. Cluett, Oil & Gas Co., 82nd Pac. 47.

**Mining Claim: Abandonment Equivalent to Forfeiture.**—The locator of a mining claim who remains in possession but fails to do the annual work provided for by the statute which circumstances make the same rule applies where the locator abandons the possession, gives up the claim and leaves the land open to other locators. All the rights provided by the statute terminate.—Farrell vs. Lockhart, 28 Supreme 681.

\*Extract from Mineral Resources of U. S. for 1907.

# Current Literature on Mining, Metallurgy, Etc.

**Pumping Problems of the Joplin District.** Doss Brittain. Discusses the conditions that make pumping necessary in the mines.—E. & M. J., Aug. 1, 1908; pp. 346; illus. 20 cents.

**Origin and Development of Belt Conveyors.**—C. Kemble Baldwin. Deals with the origin of this device and the difficulties in the way of manufacturing a belt to stand the rigors of hard usage. Paper read before Am. Soc. Mech. Eng.—Bl. Diam., Aug. 8, 1908; pp. 2; illus. 20 cents.

**Gray Hematites of Eastern Alabama.** Edwin C. Eckel. Gives the history and development of the ranges and the geology of the district. The form and origin of the ore deposits and the character and grade of the ores are also presented.—Ir. Tr. Rev., Aug. 6, 1908; pp. 24; illus. 20 cents.

**Location and Survey of Mining Claims in Mexico.** F. B. Hyder. A recount of the various steps necessary in acquiring mining claims and explains the requirements, fees, forfeitures and methods of procedure.—Mg. Sc., Aug. 6, 1908; pp. 2; illus. 20 cents.

**Alteration of Rocks by Weathering.** Edward Steidtmann. Gives a graphic comparison of the alteration of rocks by weathering in addition to their alteration by hot solutions. The method of obtaining average compositions of the weathered rock is also given, as are the chemical and mineralogical changes.—Econ. Geol., July-Aug., 1908; pp. 25; illus. 75 cts.

**The Origin of Bombshell Ore.** H. M. Chance. The term "bombshell" ore is applied by miners and iron-masters to hollow masses of limonite-brown hematite—which sometimes are round or oval but more commonly are of any irregular shape.—Reprint from proceedings of Am. Phil. Soc., Vol. xlvii, 1908; pp. 5. 25 cts.

**Irregularities of Mineralization.** Gordon Surr. Presents the theory of causes of precipitation of minerals in veins and in zones of fracture.—Am. Mg. Rev., Aug. 8, 1908; pp. 14. 20 cts.

**The St. Louis-Montana Co.'s Litigation.** Matt. W. Alderson. A case in which a 30-ft. strip has been granted the usual apex right and a vertical right also. The litigation has taken a fresh start after a fight lasting 19 years.—The Mining World, Aug. 8, 1908; 2,500 words; illus.

**The Moisture in the Atmosphere.** H. M. Prevost Murphy. Tells of the effect of the moisture in the atmosphere on the operation of compressed air machinery, especially air brake, multiple-unit train control and train signal systems.—Comp. Air, Aug., 1908 (republished from Eng. News, June 18, 1908); pp. 8; illus. 35 cts.

**Gold: Its History and Economic Development.** Evans W. Baskett. This is the second of the writer's interesting contributions on this subject and tells of the progress shown in the metallurgy of gold.

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

In ordering, give date of *The Mining World* in which the article has been mentioned. All orders are payable in advance.

It also tells among other things of the operation of the amalgamation, chlorination and cyanidation processes for winning gold from ores, etc.—The Mining World, Aug. 8, 1908; pp. 24.

**Cyanidation in Mexico.** Francis J. Hobson. Gives results of a number of laboratory experiments made by the writer in Mexico on silver-gold ores and describes a number of plants erected.—M. & S. P., Aug. 1, 1908; pp. 2. 20 cts.

**Table of Index of Refraction and Birefringence of Rock-Making Minerals.** W. O. Hotchkiss. Points out the most useful characteristics with regard to determining minerals in thin sections of rocks.—Jnl. Geol., July-Aug., 1908; pp. 7; illus. 75 cts.

**Inexpensive Home-Made 20-Ton Mill.** Teodoro Kuhnke. Describes a mill built in Central America to treat ore overlooked by former operators, as well as the dump-sortings from abandoned mines.—M. & S. P., Aug. 8, 1908; pp. 14; illus. 20 cts.

**Continuous Slime Filter.** Robert Schorr. Describes the Schorr continuous slime filter, which is entirely automatic in its operation.—M. & S. P., Aug. 8, 1908; pp. 2; illus. 20 cts.

**Zinc and Lead Smelting in Silesia.** J. S. G. Primrose. Presents some notes on zinc and lead smelting, including the recovery of cadmium and the manufacture of sulphuric acid. Also gives brief description of a large lead blast furnace.—E. & M. J., Aug. 8, 1908; pp. 14; illus. 20 cts.

**Some Methods on the Permanganate Method for Copper.** John Herman. The method described is practically F. G. Hawley's modification of the Guess method.—West. Chem. & Met., Aug., 1908; pp. 3. 75 cts.

**The Silicious Silver Mines of Parral, Mexico.** Claude T. Rice. Parral, though long one of the large producing camps of Mexico, now depends on deeper mining and cyanidation of its low-grade ores.—E. & M. J., Aug. 8, 1908; pp. 5; illus. 20 cts.

**Equipment of Calumet & Arizona Co.'s Shops.** H. W. Chittenden. Describes briefly the various shops of the company and their equipment.—The Mining World, Aug. 8, 1908; pp. 14; illus.

**Losses of Coal in Mining a Flat Seam.** Audley H. Stow. Tells why economy of operation cannot be obtained where there

are losses of rail, poor ventilation and indifferent haulage. It also discusses the interesting question of equipment with air or electricity.—E. & M. J., Aug. 8, 1908; pp. 4; illus. 20 cts.

**The Manufacture of High-Speed Steel.** O. M. Becker. Describes the crucible process by which high-speed steel is produced. This process, although the simplest in use, is by far the most costly, the price of this steel for the best grades being not far from 70 cents a pound.—Cassier's Mag., Aug., 1908; pp. 9; illus. 35 cts.

**Method of Assaying Silver Bullion at Indian Mint.** F. T. C. Hughes. The process discussed consists in dissolving the assay pieces in nitric acid, precipitating with hydrochloric acid, and estimating the fineness of the bullion gravimetrically by the weight of chloride of silver formed.—The Mining World, Aug. 8, 1908; pp. 3; illus.

**The Technique of Coal Mining.** George H. Winstanley. This is one of a series of articles for practical mining students and those qualifying for the examinations for mine managers' certificates.—Mg. Engineering, Aug., 1908; pp. 3; illus. 40 cts.

**The Copper Deposits of Kasaan Peninsula, Alaska.** Charles W. Wright. The occurrence of copper on the peninsula was known to the Russians as early as 1865, but not until 1900 did active developments begin. The first copper was produced in 1905.—Econ. Geol., July-Aug., 1908; pp. 8; illus. 75 cts.

**Hydraulic Concentration: The Power of Floccing Water.** Benjamin Waites. Discusses the concentration of slimes and classification of sands; also the manufacture of sulphuric acid.—S. A. Mg. J., July 11, 1908; 1,200 words. 25 cts.

**Electrodeposition of Nickel.** Edward F. Kern and Francis G. Fabian. Discusses electroplating, recovery of nickel from nickel-copper alloys and matte, production of solid adherent deposits of nickel, solubility of nickel salts, and gives the results of numerous experiments.—Sch. of Mines Quar., July, 1908; pp. 29. 75 cts.

**Concentration of Slime.**—Edwin A. Sperry. This is the second section of an article on this subject and is devoted to "Sizing." Briefly describes the term "mesh" and claims that by the use of the metric terms in designating the size of open space much confusion and misunderstanding would be done away with. A screen table is given, showing mesh and wire of various sizes, with equivalent open spaces.—West. Chem. & Met., Aug., 1908; pp. 7; illus. 75 cts.

**Alumina in Copper Blast-Furnace Slags.** Charles F. Shelby. A study of a variety of slags with evidence to show that alumina invariably acts as an acid combining with more basic oxides.—E. & M. J., Aug. 8, 1908; pp. 6. 20 cts.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### Storage Battery Locomotive.

The Comstock Tunnel Co. has recently installed a 4-ton Jeffrey storage battery locomotive, shown herewith, for use in handling the material as they are excavated in its tunnel extension work.

This locomotive is equipped with two 12-h.p. series wound railway type motors and a 42-cell 16-k.w. hour battery which in service will give an operating range of approximately 300 ton miles on a single charge when the tracks are approximately level.

Owing to the great efficiency now attained in battery locomotive construction, a very large demand has arisen for locomotives of this general type for use in tunnel and reclamation work and about smelters and large industrial plants where

Co. of Columbus, Ohio, who build locomotives suitable for almost any possible haulage condition, including locomotives of the trolley type or combining the battery and trolley features, for use where all or only a portion of the track can be wired to advantage.

### Trade Publications.

*Cyanide Tanks, Etc.* Colorado Iron Works Co., Denver, Colo. Catalog No. 10-B. Pp. 112; illustrated.

In conformity with the company's recent practice, a short outline of the cyanide process is given, intended for those who are not familiar with its chemistry and technique. This is followed by a description of the machinery and equip-

ment gas producer and gives the results of a number of tests made on a large number of diversified kinds of bituminous fuel. This producer is more fully described in the company's catalog No. 22, which will be sent on request.

*Stope Drills.* The Cleveland Pneumatic Tool Co., Cleveland, O. Bulletin 40. Pp. 12; illustrated.

Describes the Cleveland stope drill which is especially designed for stoping and overhead work. It is of the valve type, a simple reversible spool valve being used which can be taken out or put in the valve chest from either end.

### Industrial Notes.

The Deister Concentrator Co. of Fort Wayne, Ind., has received an order for 16 of its No. 1 tables from the Champion Copper Co., Freda, Mich.; also an order for three of its No. 3 tables from the Arizona Gold Mines & Milling Co., Patagonia, Ariz.

The Cement Securities Co., of Denver, Colo., has appointed F. L. Smidt & Co., 41 Cortlandt street, New York city, its consulting engineers. The Securities Co. controls Portland cement plants operating at Portland, Colo., and Devils Slide, Utah, and under construction at Three Forks, Mont., and El Paso, Tex.

A new machine shop and foundry is under construction for the Goldschmidt Thermit Co., 90 West street, New York city. The building occupies a site 34 by 90 ft. in size, just back of the company's present factory in Jersey city, and is to be fitted up for the purpose of handling to better advantage the extensive repair work which is now being carried on at these works. Special attention will be paid to the rapid execution of the repairs to electric motor cases, truck frames, cast steel gear wheels, crank shafts, and, in fact, any wrought iron and steel sections not exceeding 2,000 lbs. in weight.

The Ilazard Mfg. Co., Wilkes-Barre, Pa., has about completed improvements to its plant, which will increase the capacity 50%. This will include a new wire rope mill and power plant, containing many important features in equipment and arrangement. The new wire rope building is on the opposite side of the street from the present plant, to which it is connected by both a bridge and a subway. It is 50 by 165 ft., four stories and basement, of brick and steel construction, and the two lower stories are equipped with two 5-ton traveling cranes, the upper floors containing the machinery for the manufacture of wire rope. The new power plant is equipped with 1,200-h.p. of Babcock & Wilcox water tube boilers, with the corresponding horsepower capacity of engines and generators. As soon as the new power plant is in operation the space occupied by the old building will be used by other departments. The machinery is to be motor driven, and shipping facilities are furnished by a switch from the Pennsylvania railroad, which runs between the new rope mill and the power plant.



Four-Ton Jeffrey Storage Battery Locomotive.

considerable quantities of materials are transported locally.

Where the hauls are not too long and the tracks are approximately level, battery locomotives weighing from 2½ to 7 tons are heavy enough for all ordinary purposes, and the cost of installation ranges from \$1,800 to \$3,400, depending upon the size. If the services of from two to six men, otherwise employed in pushing industrial cars from place to place, are thus dispensed with, locomotives in service show a net saving of from \$200 to \$2,000 per year, after deducting all proper charges, including operating expenses, maintenance, depreciation, and interest on the investment.

Where the number of laborers replaced does not exceed six, the services of a locomotive are usually required for only a very short time each day. If the work necessitates its being in constant use, a much larger force of men is replaced and the saving effected is proportionately greater.

The economy in actual cost of operation is often secondary to the saving which indirectly results in all departments from the promptness and facility with which the material is handled.

The locomotive in question was purchased from the Jeffrey Manufacturing

Co. of Columbus, Ohio, who build locomotives suitable for almost any possible haulage condition, including locomotives of the trolley type or combining the battery and trolley features, for use where all or only a portion of the track can be wired to advantage.

*Crushing Rolls.* Power & Mining Machinery Co., Cudahy, Wis. Bulletin 28. Pp. 20; illustrated.

Discusses the early history of crushing rolls and the improvements that have been made. Gives a general description accompanied by charts and tables of the company's Superior rolls. A diagram is also shown giving the speed and capacity of these rolls.

*Spiral Riveted Pipe.* American Spiral Pipe Works, Chicago. Pamphlet No. 22. Pp. 18; illustrated.

Attention is called to the many different uses for which Taylor's spiral riveted pipe is especially adapted. The pamphlet is illustrated by half-tones from photographs taken from installations made by the company in various parts of the country.

*Suction Gas Producer.* Weber Gas Engine Co., Kansas City, Mo. Folder; illustrated.

This attractive brochure, No. 60, fully describes the Weber "down-draft" suc-

## Personal.

J. M. Callow has returned to Salt Lake, Utah, from a business trip to Alaska.

Leo Rosenberg of New York city was in Montana last week examining mining properties.

Joseph Kreis, of New York city, recently inspected a mining property at Wonder, Nev.

Victor C. Alderson, president of the Colorado School of Mines, is on his way home from Europe.

J. Parke Channing recently completed an inspection of a mining property in the state of Sonora, Mexico.

George Crerar has been appointed general manager of the Beryl Mining Co., with properties in Lower California.

G. M. Gillette has resigned as superintendent of the Wahash mine at Park City, Utah, and is now located at Salt Lake.

W. B. McBride has been appointed general manager of the Sonora Cons. Mines Co., with property in the state of Sonora, Mexico.

C. E. McConnell of Durango, Colo., president of the Ely Revenue Copper Co., is looking over the company's property at Ely, Nev.

W. W. Word, of Word Bros., Denver, Colo., manufacturers of Word Bros.' drill maker and sharpener, was in Chicago recently.

C. C. Goldsberry, manager of the Guachale mine, at Ocotlan, Oaxaca, Mexico, has returned to the property from a visit to the United States.

Robert H. Gross, president and general manager of the East Butte Copper Co., has returned to his home in Boston from a visit to the property at Butte, Mont.

H. W. Harding, mining and metallurgical engineer, 43 Exchange place, New York city, has returned from a professional visit to the Cobalt camp, Ontario.

J. H. Blanchard, president and general manager of the Goldfield Combined Mining & Leasing Co., Goldfield, Nev., has been in New York city on company business.

H. Otto Hanke, president of the Daly-Judge Mining Co., has returned to Cincinnati, Ohio, from a visit of inspection to the company's property at Park City, Utah.

J. B. Jensen is in charge as manager of the Ogden smelter, near Hot Springs, Utah, now being operated by the Independent Smelting Co. R. H. Vail is superintendent.

George W. Maynard, consulting mining and metallurgical engineer, 20 Nassau street, New York city, is making a mine examination at Idaho Springs, Colo., for New York clients.

Charles Fasel has been appointed manager of the Butte & Buxton Mining Co., Butte, Mont., succeeding Peter Lackner, who recently resigned that position as well as a director of the company.

Walter S. Keith, lately superintendent of the Oregon Smelting & Refining Co., Sumpter, Ore., has opened an office as

consulting engineer and metallurgist at 601 American Bank building, Seattle, Wash.

Edward L. Dufourcq, mining engineer with offices in the Produce Exchange building, New York city, and who has been ill in a hospital in Mexico City for a month past, has returned to New York city greatly improved in health.

Prof. H. C. George, for three years in charge of the engineering department of the Western University of Pennsylvania, has been engaged as director of the Mining Trade School at Platteville, Wis., succeeding R. B. Brinsmade, resigned.

F. G. Clapp, for several years with the U. S. Geological Survey, in investigations and preparation of reports on coal, oil, gas and artesian waters, has formed a partnership with A. W. Bee, Jr., and offices have been opened in Pittsburgh, Pa.

Charles B. Morse, formerly publication manager of the Ingersoll-Rand Co., and more recently of the Campbell Art Co., is now associated with the Robert L. Stillson Co., of New York, at 122 Centre street, in the preparation and the printing of advertising literature.

## Obituary.

Ernest Flies, manager of the Haile gold mine, near Kershaw, S. C., died last week from the effects of injuries received by the explosion of a boiler at the mine. Three workmen were badly injured and the company's stamp mill and engine house were completely wrecked.

William A. Dennis died recently in Los Angeles, Cal., while walking on the street. Mr. Dennis came to California in 1855 and was one of the foremost mining engineers on the coast. He was a graduate of the University of the Pacific at San Jose, and was for many years superintendent of the New Almaden quicksilver mine in Santa Clara county. During his and expert for the Bank of California in San Francisco. His acknowledged supremacy in his work was combined with an integrity of character that made him as much respected for his personal worth as for his acumen and talents. Besides a widow he leaves four sons and a daughter: three of his sons, Frank J., a graduate of Stanford, of Harvard Law School and of Cornell, is employed as an expert by an English syndicate operating in China, Corea and Portugal; Clifford J., is a mining engineer in charge of valuable properties at Ehrenberg, Ariz.; and Charles G. Dennis, a mining engineer of Los Angeles.

## Technical Schools and Societies.

*Wisconsin Mining Trade School.*—The fall term of the school at Platteville opens August 31, with Professor H. C. George as director. The shops and laboratories have been refitted during the summer vacation. A good attendance is promised.

*Cobalt Branch Canadian Mining Institute.*—At a recent meeting plans were

discussed for the entertainment of the guests of the Institute on the annual excursion, which will reach Cobalt early in September. The guests of the society this year will include some of the most prominent mining engineers and mineralogists in the world. Representatives of English, German, French, Belgium and American technical societies will attend this meeting. An examination of the Cobalt mines will be made on September 5.

*Rocky Mountain Club of New York.*—The club now has a membership of 500 and recently has had to secure larger quarters. It has leased the entire west wing of the 15th floor of the Waldorf Astoria, where it has a large reception room in addition to a suite of 12 smaller rooms. The entertainment committee, of which Colvin B. Brown is the chairman, announce that the regular Saturday night smokers will be resumed early in October and that upon each of these occasions the club will be addressed by a speaker familiar with the various sections of the west. Stereoscopic views and moving pictures will be used to illustrate the lectures. Much interest in the west was created by this kind of entertainment given by the club last winter and it is proposed to continue the work of education and to amplify it so as to cover all sections. After the lecture a lighter form of entertainment is provided for members and guests. John Hays Hammond is the president of the club; A. J. Seligman, vice president; W. B. Thompson, treasurer, and James J. McEvilly, secretary.

*International Association for Testing Materials.*—The fifth congress of the International Association for Testing Materials represented in this country by the American Society for Testing Materials, will be held in Copenhagen, Denmark, early in September, 1909. Arrangements are actively in progress, and the indications are that it will be the most successful convention in the history of the organization. The program will consist largely of official reports of standing committees and individual referees on subjects relating to the testing of materials. By action of the council nonofficial papers by members of the association will be restricted to the following subjects: A. Metals—(a) Metallurgy; (b) Hardness Testing; (c) Impact Tests; (d) Testing Metals by Alternating Stresses, Thermal Treatment, etc.; (e) Testing of Cast Iron; (f) Influence of Increased Temperature on the Quality of Metal. B. Hydraulic Cements—(g) Reinforced Concrete; (h) Progress in the Methods of Testing; (i) Cement in Sea Water; (j) Constancy of Volume; (k) Tests by Means of Prisms and Standard Sand; (l) Weathering Resistance of Building Stones. C. Miscellaneous—(m) Oils; (n) Caoutchouc; (o) Wood; (p) Paints on Metallic Structures. The International Association has begun the publication of Proceedings, which will be issued three or four times a year. Further information will be given by the general secretary of the International Association, H. Nordbahnstrasse 50, Vienna, Austria, or by Edgar Marburg, secretary American Society for Testing Materials, University of Pennsylvania, Philadelphia, Pa.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ALASKA.

For the month of June the Alaska-Treadwell Gold Mining Co. ran its 240-stamp mill 30 days and the 300-stamp mill 30½ days, treating 79,988 tons of ore. The realisable value of the bullion was estimated at \$102,000. Besides this 1,415 tons of sulphurets were saved, having an estimated realisable value of \$73,378. The working expenses were \$86,064.

It is reported that the new railroad which is being built by the Guggenheim Exploration Co. to tap the copper country now under development around Copper river will be in operation some time next year from Cordova to Abercrombie rapids, a distance of about 60 miles.

According to a recent report the Guggenheim Exploration Co., whose copper mines are in the Copper River country, will ship its ores by rail to Cordova, thence to the company's smelters at Tacoma, Wash.

Samuel Silverman, in behalf of the Hadley Cons. Copper Co., has purchased the Mamie mine in the Ketchikan district. This company also owns the Stevestown mine. The company intends to mine 100 tons daily from the Stevestown and 50 tons from the Mamie. Both of these mines have been good producers. George E. Green is to be general superintendent of the properties.

Prospectors in the Pelly river valley state that they have found gold on the bars all the way from the river mouth to the lakes.

The Alaska Mines Securities Co. announces that it is starting up its mines at Hadley, which have been shut down since last July owing to the unsettled condition of the copper market.

## ARIZONA.

Another successful and final test run was made last week of the new ore handling system of the Copper Queen Co. at its Sacramento shaft. The hoist and skips recently installed worked perfectly. Shipments from the Copper Queen mines at present run about 37 cars daily, of which 34 cars are shipped to the company's smelter at Douglas and three cars of sulphides to the Old Dominion Co. at Globe. The Calumet & Arizona Co. continues to ship about 23 cars of ore daily to its smelter at Douglas. The results of recent underground exploration work are most gratifying to the management.

The Superior & Pittsburg properties are shipping between 12 and 16 cars daily to the Calumet and Arizona smelter at Douglas. The ore body is being developed on the Supplement claim by a crosscut from the drift connecting the Cole of the Superior & Pittsburg and the Olive of the Calumet & Arizona on the 1,000 level, is showing up well and promises to be one of the best ore bodies

in the properties of the Superior & Pittsburg Co. Shipments from the Junction shaft are of a richness that is seldom surpassed or even equalled in the district.

The installation of the sixth furnace at Calumet & Arizona smelter at Douglas is progressing and it is probable that it will be blown in this week. Three new converters of the same pattern as those in use at present, have arrived. The foundation for the addition to the power house is being constructed and the work will be rushed. Material is already on the ground for the extensions to the other of the five furnaces. This work will be commenced as soon as the new No. 6 furnace is in use. The output for August will not be affected by the new work.

## Phoenix.

News has been received here of a good strike having been made in the Walk Over group of claims in the Gila range. 15 miles southeast of Yuma. In a tunnel 25 ft. in a 22-ft. vein on the exposed ledge of 300 ft. of gold-bearing ore, running from \$4 to \$15 a ton, was encountered. Underhill and Crane, the owners of the property, estimate that there is \$1,000,000 worth of ore in sight. The owners are now working actively on the find. Considerable excitement has been aroused over the strike and a number of men have gone out to locate claims in the vicinity of the discovery.

The Tombstone Cons. Mines Co. has begun the work of prospecting preparatory to resuming operations on the Lucky Cuss property that has been idle since the early part of last winter, when the entire plant was burned. The shaft was not injured by the fire. At the time the fire occurred one of the richest bodies of ore ever encountered in the mine had just been uncovered in the winze that was being sunk from the 800 level. It is for the purpose of opening this ore body that the company is anxious to begin work. The mine has been one of the best producers in the Tombstone district and has always been made to pay its way and extensive dividends as well. The work of removing the machinery from the Tough Nut mine of the company is being rushed under the superintendency of Mart Hoar, who expects to have the entire plant on the grounds of the Lucky Cuss mine and everything ready to begin the hoisting of ore by Sept. 15.

## Globe.

Since the late discovery of rich gold sulphide on a contract claim belonging to Thomas, Hedspeth, Wimberly and Henry, at Globe, a vertical shaft has been sunk 59 ft., penetrating 24 ft. of ore that assays \$22 in gold to the ton, 25% sulphur and 26% iron. The shaft is bottomed in ore which shows no sign of pinching. The vein near the surface is 6 ft. wide and appears to widen at the

bottom of the shaft, as rock from what was supposed to be the hanging wall, was tested and found to carry \$7.50 to the ton in gold. The property is situated 6¼ miles south of Globe in the foot hills of the Pinal range and is reached over a fairly good wagon road, so that the cost of delivering ore to the railroad or Old Dominion smelter will not be great. Development work will be pushed and shipments of ore commenced at an early date. Two shifts will be put on and the shaft sunk to 100 ft. at which depth a crosscut will be run and the vein opened by drifts.

## Bouse.

An important consolidation has been effected of the following companies with properties in the Santa Maria district in Yuma county: The Signal Copper Co., capital stock \$5,000,000; Clara Gold & Copper Mining Co., capital stock \$2,000,000; Crown Princess Mining Co., capital stock \$1,000,000. The Morro group of gold and copper claims is also included. The total properties comprising 132 claims have been merged into the Clara Cons. Gold & Copper Mining Co., capitalized at \$3,000,000. The company is crowding development work. One gasoline hoist is in operation and another under construction. A steam hoist and plant with capacity for hoisting 2,000 ft. is on the way. Development will be pushed to the 1,000 level. George Mitchell is general manager.

## CALIFORNIA.

### Nevada City.

The Washington Mining and Milling Co. has secured full possession of the Giant King group of mines. The new owners are driving the tunnel to tap the main ore body which they expect to reach within 250 ft. A 500-hp. electric power plant will be installed below Washington at the junction of Poorman's creek and the south fork of the Yuba river to operate the new 20-stamp mill. Three compressors will be installed and the three claims worked with machine drills. The machinery for the new mill is on the ground and will soon be placed. It will be so situated as to receive ore from the Crumbacker, Giant King and Monday tunnels at a minimum expense. A large force of men will be put to work as soon as full arrangements can be made. The ledges in the Giant King are very wide, with fair values running throughout.

H. G. Torrence and associates are expected to arrive soon in this city from London. They are interested in the English syndicate which recently acquired an option on the Champion and Delhi mines. The syndicate has secured an extension on the bond to Sept. 1. Leasers are working at the Champion with good results. The Delhi is one of the dividend paying properties of this district.

Following the failure of the Hayes brothers to exercise their option on the Oustomah mine, the property has revert-

ed to the owners and will be worked by them. Arrangements are being made to immediately resume operations with a large force of men. Frank S. Morgan is superintendent.

The company of eastern and California people which recently took over the Lecompton mine, has acquired a bond on the Normandie group at Grass Valley and will immediately commence vigorous operations. The Normandie shaft will be unwatered and sunk to greater depth and a new shaft will be put down on the DuLainie claim. It is planned to install considerable machinery. Two good veins traverse the group and carry excellent values. Harry S. Abbott is general manager.

The Lecompton shaft has been unwatered to the 300 level and it is expected that the 500 level will be reached within 10 days when active developments will be commenced. A 12-in. Cornish pump is employed. A good ledge of milling ore is known to exist at the 500-ft. level and will be opened up rapidly. Samuel Colt is superintendent.

The New York-Grass Valley mine has been forced to suspend operations owing to the shutting off of water by the New Blue Point Co. This water was necessary to enable the company to operate its surface equipment and it is likely that the matter will be taken into the courts by the New York-Grass Valley people. The New Blue Point Co. is enlarging its ditch and expects to employ 150 men in the work. The New York-Grass Valley was only recently re-opened after several years of idleness. Eastern people are largely interested.

Active work has commenced at the Morydena and the 50-ft. shaft will be sent down to considerable depth. As fast as finances can be arranged for developments will be pushed. A strong ledge of fair-grade ore exists at the bottom of the shaft. San Francisco people are chiefly interested in the property. Charles Deacon is superintendent.

Drifting on the ledge at the 500-ft. point in the Idaho-Maryland mine is going forward steadily. The ledge continues to average about 6 ft. with values occasionally running into the thousands. The mill is running steadily. The work of unwatering the shaft to the 1,000 level is expected to commence at an early date. Bray Wilkins is general manager.

Sinking has been resumed at the Midas and the shaft is being sent down rapidly to its junction with the old workings. Owing to the influx of water operations were suspended for several weeks until a pumping plant and hoist could be installed. In the old workings a small ledge of rich ore is exposed. Arrangements are being made to shortly resume activities at the California mine. Considerable good ore is developed.

Owing to the scarcity of water, the South Yuba Water Co. has informed the local mining companies that it will be forced to cease supplying them with water for power purposes at the end of 30 days, unless conditions soon change for the better. The company is using the reserve water and will be compelled to maintain an adequate supply for Grass

Valley and Nevada City. The condition is due to the light rains last winter and the exceptionally hot summer.

A 22-ft. ledge giving fine assays of \$30 to the ton has been encountered in the Corotoman placer mine, operated by the Oregon Creek Mining Co. at Forrest. A crosscut is being driven to develop it. The channel is about 80 ft. wide and from 2 to 5 ft. deep. Forty men are employed. Captain J. W. Morrell is superintendent.

The shaft at the No Better group is down 75 ft. and is being rapidly deepened. It is planned to carry it down to 500 ft., driving crosscuts to develop the ore bodies. John C. Chandler is in charge.

#### Marysville.

The California Mother Lode Mining Co. has resumed active operations at the Eagle group in the Indiana Ranch section. Work is being conducted on a large scale and a large force of men is employed. The mine is one of the best known old-time producers of Yuba county and contains several good ledges of milling ore. The mill is being overhauled and new metallurgical methods have been adopted. More stamps have been added to the plant and many improvements are under way. The camp is being equipped with electric lights, telephones and other modern conveniences.

Throughout the county mining activities manifest renewed vigor. At Smartsville the Blue Point mine is being rapidly placed in shape for early production. At Camptonville, Challenge and numerous other points active work on a large scale is under way in many of the old prospects, while numerous prospects are showing up remarkably well.

At Brown's Valley a marked revival is evident. The Pennsylvania recently renewed operations, after a long period of idleness, and two adjoining properties are also showing up well and producing good ore. More activity is at present displayed in this district than for several years.

At Marigold and Hammon on the Yuba river, several large dredges of the latest type are producing large quantities of gold. Several eastern people are interested in the dredging companies and the excellent returns yielded by the gold boats have encouraged several operators to become interested in near-by quartz propositions.

The Marysville Dredging Co. is building at Marigold what is said to be the largest dredger in the world. It will be known as Dredge No. 3 and will require eight months to construct. It will be built throughout of the best Oregon pine and steel. The company is planning several improvements to its properties to augment the annual yield. The new dredger will be launched in one of the richest dredging sections in the state and will add materially to the annual yield of the county.

At Oroville most of the dredgers are working full-handed and maintaining their normal production. The various owners are landlocking their boats to prevent conflict with the anti-debris people. The trouble between the anti-debris and dredger interests seems in a fair

way of amicable settlement. The Oroville trustees have notified the owners of the Indiana dredge to cease obstructing the river and either suspend operations or conduct them in such a manner as not to menace the city. It is claimed that the dredger is blocking the river with debris and that unless precautionary measures are taken a repetition of the flood of March, 1907, which inundated the city, will follow.

Operations at the Cooney diamond mine near Oroville are progressing steadily. A large area of the blue formation has been explored by the diamond drill. Several good stones were recently taken from the shaft. The mine was recently inspected by South African diamond-mining experts, and pronounced to be a most promising property. It is being developed by an association of Oroville men.

Water has been turned into the ditches of the Bonnie hydraulic mine at Greenville and extremely satisfactory results have been obtained by ground sluicing. Eighteen men are employed putting the finishing touches to the dams and flumes. It is expected to work the mine on a large scale for the greater portion of each year and if results come up to expectation a stamp mill will be installed. The Bonnie is the most extensive placer proposition in central California.

The Alaska mine at Pike city has resumed operations. The new shaft will be unwatered and sunk to considerable depth. Several new pumps, including two of the centrifugal type, were recently installed. As soon as the shaft has been unwatered developments will be commenced. A small force of men is employed.

The Keystone mine at Sierra City has resumed activities after a brief shut down during which an auxiliary electric power plant was installed. A large body of milling ore is developed and the mill will immediately be started up. Forty men are employed.

The Sierra Buttes is producing excellent ore and 40 stamps are dropping steadily.

Work has been resumed at the Gibraltar mine on Canyon creek. A shaft is being sunk with the expectation of striking a gravel channel.

An 18-ft. vein has been encountered at the Grizzly Co.'s mine at Poker flat. One hundred tons of ore is in the bins for immediate treatment.

Work has been resumed at the Woodside-Eureka mine at Georgetown. The Eureka shaft is being rapidly unwatered and will be used exclusively for the transportation of ore from the lower workings to the surface. Vexing delays have prevented the resumption of work at an earlier date.

The Garden Valley mine at Greenwood will resume operations in the course of a few days. New machinery has been ordered and it is intended to work the property on a large scale.

#### Los Angeles.

The Golden Rod Mining Co. lately organized and composed mostly of San Diego and Los Angeles people, with a capitalization of \$250,000, \$126,000 paid up, owns a group of three claims 50



miles from Johannesburg and eight miles from Ballarat on which is a 5-stamp mill. A trial run of 17 days on ore from the property netted \$500 in gold and the new company contemplates adding 15 additional stamps. This property is located just over the mountain outside of Death valley.

Ore-taken from the Great Hopes mine 16 miles north of Mojave, near the Southern Pacific line building to Keeler, has given, according to a report from the Needles smelters, a return of \$40.96 to the ton from 1,600 lbs. of rock taken from the 1,600 ft. of underground workings. Another lot sent to Salt Lake gave returns of 5.6 ozs. silver, 15.5% lead, and 20.5% copper to the ton. The company is making arrangements to put on an air compressor and power drills.

J. E. Koebbe of the Italy Gold Mining Co., states that messages from his company are to the effect that the sand of its ground is yielding from \$50 to \$300 to the ton.

## COLORADO.

### Denver.

The great mill of the Gold King mine at Gladstone near Silverton, which was destroyed by fire some months ago, is being rebuilt, and it is hoped will be in running order by Nov. 1. For many years the Gold King has been the largest producer in San Juan county and the enforced suspension of work there has seriously affected the prosperity of Silverton and the entire mining industry of that section. The vein in the mine averages 12 ft. in width, but in places it broadens to 40 ft., all good milling stuff. The mill had 80 stamps with a complete equipment of amalgamating and concentrating devices including a large intake mill.

L. Gentry of Chicago has, with George Crawford of the Red Mountain Mining, Railway & Smelting Co., been examining the properties of that combination in Ouray county. It is given out that Mr. Gentry, being well satisfied of their value, will pay indebtedness amounting to about \$50,000 and furnish sufficient working capital to resume operations in the various mines. This if accomplished will stimulate the reopening of a number of large well developed mines that have been idle for some time.

Work in the Treasury tunnel is proceeding, with 16 men employed.

A car load of high-grade copper ore was recently shipped from the Iron City in Corkscrew gulch.

The De-Osray people who have for the past two years been working their property have intersected their vein and are now blocking out ore.

Mining companies in the Telluride district shipped during July 106 cars of concentrates, exceeding by 35 cars the output for June. In addition shipments of plate or amalgamated bullion are sent out by express three or four times a week. This is the best year the county has ever had. Ophir station is also credited every month with a large amount of ore and bullion.

It is understood that the lease on the Pandora mine, held by the Pandora Leasing, Mining and Development Co., at

Telluride for the last three years, has reverted to the Smuggler-Union, and will be let for a term of years to J. A. Manifold of the old leasing company.

The recent strike in the Sandy Hook tunnel proved much better than when first reported. The vein where cut is 8 ft. wide and the ore assays \$30 to the ton.

Some excellent ore has been opened up in the Cortland tunnel. Three veins aggregating 2½ ft. of mineral range from \$20 to \$40 to the ton. Streaks on the walls run from \$80 to \$100 to the ton. The high-grade ore is sacked and the lower grades milled.

George Brandt, manager of the Brand Independent Mining Co., will erect a new 30-stamp mill this summer. He has already purchased an engine, boilers, a 10-drill compressor and about 1,500 ft. of 3-in. pipe for a water line to supply the mill.

The vein in the Camp Bird mine at Bowerman has been intersected by the tunnel. It shows 5 ft. in width and is of higher grade than any heretofore developed.

The Abe Lincoln mill in the same district is being put in order to treat the large masses of ore showing in the tunnels.

The Enterprise mine near the heart of Taylor park has resumed operations. The working force will be increased when certain new machinery is placed.

Robert Harper, owner of the Brooklyn mine on Galeata mountain in the northwestern part of the county, has arranged to resume work on the Brooklyn tunnel, which has an equipment of machinery. It will cross a number of fissure veins showing big ore shoots at the outcrop. The lodes in this locality carry large quantities of high-grade lead ore.

The Dupont Tunnel Co. will drive its tunnel just above the old town site of Schofield, through two mountains and thus open a transit way between Yule and Rock creeks, a distance of two miles. A plant of machinery is to be installed before winter sets in and two shifts of men put on.

So far this year 24,085 tons of ore and concentrates have been sent to market from the Creede camp.

Leasers on the dumps of the Commodore at Creede are sending considerable ore to the smelters. Those working on dump No. 4 are putting in a tramway down to No. 5 station.

Prospectors have discovered a new gold district four miles north of Howard. The west peak of Howard mountain is an immense phonolite flow out and the east peak is basalt. Coming down from these peaks are enormous dykes, all heavily impregnated with copper for a distance of two miles. There are a number of east and west veins which contain hematite bearing from ½ oz. to 2 ozs. of gold and 5 to 10 ozs. silver to the ton that can readily be treated by cyanidation. The gold-bearing area is about two miles square.

The shipments of mill concentrates from Silverton last month amounted to 2,575 tons and of crude ore to the smelters 1,850 tons.

A home leasing company, in which 11

of the former workmen in the mines and mill of the Iowa Gold Mining Co., together with Otto Mears, Henry Sherman and J. H. Slattery are interested, has been formed to re-open and operate the Iowa and Tiger properties. The mill which was badly damaged last winter by a snow slide, will be repaired and the mines vigorously exploited.

The Contention mill has been started up again and is running on ore from the Champion.

Each day's development adds to the valuable ore reserves of the old North Star and large bodies are being blocked out.

The work of rebuilding the Gold King mill is progressing rapidly.

Edgar S. DeGalyer of Ironton, having acquired about 600 acres of mining ground on Red and Brown mountains, intends to develop them by two tunnels from Gray Copper creek. When finished he will erect a copper matte smelter near the tunnels. The plan is similar to that of the Red Mountain Railroad Mining & Smelting Co. in another part of the same district.

### Leadville.

E. E. Christensen of Leadville has found very rich ore in a claim he is working in the vicinity of Twin Lakes. Samples assay very high in lead with fair values in gold and silver.

A streak of high-grade gold ore has been encountered in the Columbine tunnel on Mount Elbert. The vein is reported to be 10 ft. wide.

Regular shipments are going out to the Arkansas Valley smelter from the Margaret property at Granite. The average value of all the ore that has been produced in the last six months was 12 ozs. gold to the ton.

Manager Davis of the Yak tunnel has secured options and right of way to all of the ground from the present heading to the Dolly B. group in Big Evans, a distance of one mile. The breast of the tunnel is now 15,000 ft. from the portal and is at the edge of the Resurrection group. When the work mapped out is finished the entire Big Evans amphibolite will be drained and made available for mining.

Another strike is reported from the Star of the West mine on Iron hill. For the past week a vein of silver has been followed which promise to develop into a great ore body.

The Ilex No. 4 shaft, which has since the first of the month been closed for repairs, will probably be re-opened about Sept. 1.

The Huckleberry at St. Kevin promises to become one of the most productive mines in the western part of Lake county. The ore shipped thus far is of exceptional grade and a large shoot has been opened up. A new engine has been installed and other improvements are being made.

### Cripple Creek.

The Portland mine continues to be the largest producer and dividend payer in the district, the monthly output being about 9,000 tons, which yields about \$200,000 in gold. Several new shoots have been opened in the lower levels, all carrying

smelting grade ore. The vein exposed in the 1500 level is from 4 to 5 ft. wide and yields from \$60 to \$100 to the ton.

O. W. Colton, who is working block 212 of the American Eagles on Bull hill, has cut a vein 12 in. wide that runs 30 ozs. gold to the ton. The balance of the shoot which is of good size, returns 4 ozs.

The various properties on Bull hill are producing about one-fifth of the gross output of the district.

The Isabella is shipping 1,200 tons per month of smelting-grade ore and 100 tons of dump stuff is run through the mill daily.

All of the lower-grade material from the Tribby is treated in the Tribby mill.

The Gold Sovereign is producing about 60 cars per month, and the Last Dollar 20 cars of \$30 grade.

Over 800 tons per month from the Ramona property is being milled at the Wild Horse mill.

Two new strikes have been made in the South Clara D. of the Lexington. Grab samples assayed \$100 to the ton.

The lessee of the E. Porter Gold King on Gold hill, have opened up four shoots that run from 1 to 2 ozs. to the ton.

A general examination of the Golden Cycle has just been made for the advancement of its eastern stockholders.

The newly reconstructed mill at Gillette is being fitted with concentrating tables for the better treatment of ores. This concern has been handling the old Kimball dumps at the rate of 150 tons per day.

L. A. Van Tilborg and Fred, Baker have opened up a good-sized body of smelting-grade ore in the Comanche Plume on the west side of Battle Creek mountain. The vein is 4 ft. wide and runs from 2 to 6 ozs. to the ton.

## IDAHO.

Mullan.

The Greenoughs announce that they now have control of the stock of the Panhandle & Idaho Smelting & Refining Co. and that the title of the company will be changed to the Idaho Smelting & Refining Co. The property consists of a smelting plant at Ponderay, near Sandpoint, and was originally built by J. Herbert Anderson and associates of Chicago. Besides the smelting plant the company owns large tracts of flaxing ore near the shores of Lake Pend Oreille. S. W. Gebro and other Montana men are interested with the Greenoughs. The smelter is being enlarged and will handle about 250 tons of ore per day when all improvements have been completed. C. C. Titus is the ore buyer for the new concern and John Mocine, formerly manager of the Snowstorm mine here for the Greenoughs, is the general manager.

The Greenoughs have also purchased a large group of copper claims near the Granby smelter and will develop these on a large scale. William Roberts of Mullan will have direct charge of this work. The purchase of the Ponderay smelter will probably result in an increased production of the Snowstorm mine.

The Star Mining Co. is now engaged in drifting west towards the Ivanhoe

property. While the ore is not so good as in the east drifts it still shows several feet of good milling ore.

The Copper King Co.'s new tunnel is now under construction and work will be continued until it is completed.

The National Mining Co. is making preparations to resume work on its shaft at the head of Deadman gulch. The shaft is now down 200 ft. This work will be continued to lower levels. The company is well equipped with late machinery for shaft work and has a well defined vein of lead-silver-copper ore. The company is under the control and management of Kratzer & McKinnis of Wallace.

Charles B. Walker of Joplin, Mo., is in the district testing a concentrating battery of his own invention, named the Coulee concentrator, which the inventor claims will save within 2% of the value of the ores treated. One of the machines will be tried in the Morning mill of the Federal Co. at Mullan.

Three deeds were this week filed with the country recorder between the Imperial Mining Co. and Mark Cooney of Burke. By the first of these Cooney transfers to the Imperial Co. a parcel of ground under the surface of the Arlington and Nevada lode claims in Lelande district for a tunnel site, the consideration being \$1. The second transfer embraces a portion of the Timber Queen claim, the consideration being \$1,000. The third is for a consideration of \$1,000 and calls for a tunnel site through the Timber Queen, Arlington and Nevada claims. Wallace.

Patrick Brady and William Goggin have resumed work on the Panhandle claim and will ship at once a trial car of the ore. The property is developed by a shaft 75 ft. deep, and from this shaft Brady and his partner took out while sinking, 150 tons of high-grade lead ore. A drift 80 ft. long has been run from the surface to get under the shaft for air and after striking the lead drifted 50 ft. all in ore, mostly of shipping grade. Mr. Brady states it will take 40 ft. more drifting to reach a point directly under the shaft. The claim belongs to the group owned by the Pittsburgh Lead Mining Co., Brady and Goggin owning an independent interest. The Pittsburgh Co. drove a drift 1,400 ft. on this claim at depth and came within 72 ft. of the shaft sunk by Brady and Goggin without finding ore in any quantity.

The Bunker Hill Mining Co. has declared dividend No. 131 for \$75,000. This makes a total for this year of \$555,000 and a total to date of \$10,365,000.

The New Chicago Co. near Murray is making preparations to ship 400 tons of copper-silver ore that is piled on the dump awaiting the completion of a wagon road, now building. The ore runs about \$80 to the ton.

The Nabob Mining Co. near Warner is preparing to resume operations at the mine, where a compressor will be installed, and in the near future a mill will be erected at some convenient point. The shaft on the Nabob is now down a distance of 365 ft. On the 100 level 260 ft. of drifting was done on the vein and

on the 200 level 265 ft. of drifting shows about 2 ft. of high-grade ore in a 4 ft. vein. On the lowest level over 400 ft. of drifts have been run, showing the best values and qualities of ore yet exposed. Three cars of ore were shipped last year, giving net returns of about 50% lead and 1/4 oz. of silver to the unit. The company is making arrangements to patent the group, consisting of 21 claims.

Sandpoint.

The Midas Galena Mining Co. owns 71 claims on Garfield bay, 22 miles from here. The property is reached by steamers. The present development is on the Midas group of 24 claims. No. 1 tunnel is in 60 ft. at a depth of 2,000 ft. below the apex. No. 2 tunnel is in 32 ft. 1,200 ft. below the apex. No. 3 tunnel is in 300 ft. at water level. Ore from the portal averaging, it is said, \$19.84 to the ton, \$4.80 being in gold, the remainder in silver and lead. Air compressors have been installed. A store with sleeping rooms to accommodate 48 people is being built. Two 50-hp. boilers are from Fairbanks, Morse & Co. An electric plant is to be installed and six cottages for heads of departments are to be built. Seventy men are employed in three shifts. William Baptiste is superintendent and J. M. McNichols of Portland, Ore., is general manager.

The Grouse Mining Co. at Hope, 10 miles from Garfield bay, has eight claims and is driving a crosscut tunnel to cut the ledge. The ore is galena-silver. The property is equipped with an air compressor. Two shifts are worked. Grant Sherman is superintendent.

## MISCELLANEOUS CAMPS.

Elk City.—The Elk Gold Bullion Co., owning six claims 1 1/2 miles from here, has two shafts down respectively 32 ft. and 23 ft. The latter shaft cuts a 9-ft. ledge carrying a 2-ft. vein of high-grade free-milling gold ore.

Wardner.—At the Paymaster mine a vein of silver-lead ore 5 ft. wide has been struck at the 200 ft. level, that carried shipping and high-grade concentrating ore.

## LAKE SUPERIOR.

### COPPER.

Houghton, Mich.

The extensive diamond drill exploration work begun by the Osceola Cons. Co. one and one-half years ago on the North Kearsarge is developing some large resources of profitable copper ground on these properties. Excavations for the foundations for high-duty air-compressor and hoisting plants at the new North Kearsarge No. 4 shaft, are completed. Much of the building material is on the ground and parts of the heavy machinery are being received. An extension of the Mineral Range railroad from Ahmeek will provide the shaft with transportation facilities.

Work has been begun on the sinking of the two new 3-compartment shafts that are to be put down by the Ahmeek Mining Co. to serve its 12 forries in the west half of section 28 and the east half of section 29. Both shafts are started in the same collar about 1,200 ft. from Mohawk No. 5 shaft, 50 ft. from the Ke-

weenaw Central railroad and 150 ft. from the Mineral range railroad. As the shafts descend they will diverge. They will reach the lode 1,250 ft. below the collar. They will then follow the inclination of the formation, in the foot wall.

Sinking in the new incline shaft at the Seneca is now being done by steam drills, the steam plant having recently been put into service. Steam will be used until the 20-drill air compressor, now being installed, is ready. The shaft, which is collar, and then follow the inclination of the formation, in the foot wall.

The Baltic lode has been reached by the crosscut from the shaft at the 10th level at the Superior, and copper ore of the same grade as that shown in the levels above is exposed. Drifting will be commenced after a crosscut from the foot wall to the hanging wall is run. It is expected that railroad connections will be ready in September, which will give transportation facilities to the Atlantic rail.

## IRON.

### Marquette.

Mining work is not being prosecuted briskly anywhere in the iron region. Idle shafts remain closed, and idle steam shovels are to be seen in open pits. There is hardly a mine that is employing its normal force. Some big stockpiles of ore have scarcely been disturbed, and thus there is fear of further suspensions in the fall. Shipments have, however, increased somewhat lately, but sales of ore are slow. It seems to be the consensus of opinion that ore will be in urgent demand in the year to come and the shipments will approximate the record-breaking tonnage sent out last season.

Estimates of this year's requirements are still in the neighborhood of 25,000,000 tons, of which amount about one-third has now been forwarded. Much interest is shown in the announcement of the intention of Corrigan, McKinney and Co. of Cleveland, to erect two modern blast furnaces in that city. That this company plans to use much more of its own raw material in stacks of its own is believed to give assurance of more stable conditions in those mining fields in which it is interested. It is understood that the two furnaces will have a combined capacity of 400,000 tons of pig iron annually and with the necessary docks and receiving plant will represent an investment of not far from \$2,500,000. Considerable of Corrigan, McKinney & Co.'s ore is now smelted in stacks in which the concern is interested, but the greater bulk of the product of the mines is sold on the open market. As a consequence, it is not possible to keep the various properties in steady operation, such being the case now, when the mines of the company are idle on the Menominee, Mesabi and Marquette ranges.

Very little ore is moving from the stockpiles of the Corrigan-McKinney mines in the Crystal Falls district of the Menominee range. None of the ore mined at the Dunn property last winter has been moved, and shipments direct from the shaft have been suspended, all the prod-

uct now going to the stockpile. At the company's Armenia mine, a new shaft and crusher house has been built. Other improvement work has been done.

The Mineral Mining Co., of which George D. Van Dyke of Milwaukee, Wis., is president, has quit work at the Nanaimo mine at Iron River, Menominee range, and the pumps have been taken out, indicating that the shutdown is to be of considerable duration.

The Sipchen tract, across the river from the Nanaimo, is being drilled by the Buffalo & Susquehanna furnace people. The same interests are testing the ore body at the Hiawatha mine, where a diamond drill is being used from the bottom level.

The Spring Valley Iron Co., controlled by Eugene Zimmerman and associates, has developed a good mine on the J. S. Kinney tract, near Iron River, and it is expected that fairly good-sized shipments will be made this season. The property has lately been provided with railroad facilities.

Pickands, Mather & Co.'s Hemlock mine at Amara, Menominee range, is now forwarding its entire daily product, which now amounts to only about eight carloads. Part of this is going all-rail to the Northwestern Furnace Co. of Wisconsin.

The Saginaw mine at Norway, which is now understood to be controlled by the Algoma Steel Co. of the Canadian Sault, has resumed shipments. Both the daily hoist and the ore in stock are going to the docks at Escanaba. The movement had been suspended since the closing of the Algoma Steel works some weeks ago.

The 800-ft. shaft at the Briar Hill mine of the Cambria Steel Co.'s Penn group in the Norway-Vulcan district of the Menominee is being enlarged, made circular and given a lining of concrete. The circular shaft will be about 15 ft. in diameter. The concrete work is now finished to a depth of 170 ft.

Preliminary to the construction of a railroad extending from the site of the new plant near lake Antoine to the center of their section 31 property, the Jones furnace interests of Iron Mountain have organized the Iron Mountain Short Line Railway Co. The railroad will be only a mile long, as now projected, but, eventually, as additional properties are opened, it will serve a materially greater territory.

The old Conrad mine, west of Ishpeming, Marquette range, is being re-opened after an idleness of 20 years. The shaft is being deepened and a new equipment of machinery is being installed. The Independent Ore Co. is doing the work.

What is probably the largest hoisting cage in the iron region is that installed in the new "C" Ludington shaft of the Steel Corporation's Chapin mine at Iron Mountain. It is of steel, double decked, and has accommodations for 56 men at a lift.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week ending Aug. 15 and for the year to that date were as follows in pounds:

### LEAD ORE SHIPMENTS.

	Week Aug. 15.	Jan. 1- Aug. 15.
Alba-Neck City .....	188,396	188,396
Aurora .....	27,440	27,440
Badger-Peacock .....	831,920	831,920
Carl Junction .....	131,090	131,090
Carthage .....	14,170	14,170
Cave Springs .....	11,220	11,220
Duenev .....	340,020	2,852,521
Galena .....	11,390	4,179,883
Granby .....	60,160	1,083,904
Joplin .....	251,020	9,160,030
Prosperity .....	98,750	973,090
Oronogo .....	391,560	391,560
Peoria .....	1,130	1,130
Quincy .....	1,030	2,788,110
Quinn-Haxter .....	1,030	640,390
Seneca .....	154,560	154,560
Springfield .....	37,020	37,020
Spargen-Spring City .....	60,220	1,126,770
Webb City-Cartersville .....	1,024,950	24,284,637
Zincite-Sherwood .....	4,110	142,290
Total .....	1,830,150	49,243,827
Value .....	860,712	\$1,360,309

### ZINC ORE SHIPMENTS.

	Week Aug. 15.	Jan. 1- Aug. 15.
Alba-Neck City .....	188,396	188,396
Aurora .....	27,440	27,440
Badger-Peacock .....	831,920	831,920
Carl Junction .....	131,090	131,090
Carthage .....	14,170	14,170
Cave Springs .....	11,220	11,220
Duenev .....	340,020	2,852,521
Galena .....	11,390	4,179,883
Granby .....	60,160	1,083,904
Joplin .....	251,020	9,160,030
Prosperity .....	98,750	973,090
Oronogo .....	391,560	391,560
Peoria .....	1,130	1,130
Quincy .....	1,030	2,788,110
Quinn-Haxter .....	1,030	640,390
Seneca .....	154,560	154,560
Springfield .....	37,020	37,020
Spargen-Spring City .....	60,220	1,126,770
Webb City-Cartersville .....	1,024,950	24,284,637
Zincite-Sherwood .....	4,110	142,290
Total .....	1,830,150	49,243,827
Value .....	860,712	\$1,360,309

### Joplin, Mo.

Pumping machinery, acid proof, is being installed upon the J. A. Potter tract south of town. A week of steady pumping will be required to drain the ground. The lease will be re-opened when drained.

Centrifugal pumps have been installed in the Bellville camp and the ground is being well drained, the new pumps throwing more water than all the old pumps combined.

The DeMasters Mining Co. in Newton county, south of Joplin, has opened up one of the richest silicate mines in that end of the camp. The ground is well developed and a new shaft sunk. A new mill has just been erected.

The North Joplin Mining Co. near Turkey creek, is developing a rich lead and zinc mine in soft ground. The drift is very rich and is handled by three hand jigs, no crushing being required. Heavy timbering is necessary to hold the ground.

### Webb City, Mo.

A new 250-ton mill called the Shepard has been completed on the 10-acre lease of A. L. Shepard on the Center Creek Mining Co.'s land at Webb City. The work is being done below the 100 level. The drifts are almost dry. Water for the boilers has to be piped from Center creek.

The Porter land at Carthage has at last been entirely drained. The big pumps have been in operation on the tract for many weeks. The shaft will soon be sunk deeper and the rich ore deposits known to lie below the old drifts can then be worked.

The seven new shafts started a short time ago at Aurora on the same tract are now down an average of 20 ft. and

it is thought that the ore body will soon be located as the deposit in one shaft was found at 25 ft.

#### Galena, Kas.

A New York company has taken over the leases of Ping and Robertson two and one-half miles north of Galena, and will develop them at once. It was here that several rich strikes were recently made. The terms of the contract are that work must be started by September 1, and a 250-ton mill erected on each 10-acre tract of the leases as soon as ore is developed.

Boughton Bros. are developing a 40-acre tract camp and have just finished the moving and remodeling of a milling plant on the lease.

A 200-ton mill will be built on the Lizzie D. lease on the Malang and Maston land at Peacock. The company has a lease on eight acres. The ore body occurs from 174 to 188 ft.

#### Miami, Okla.

Recent drill prospecting has extended the Oklahoma zinc district across the river to the town of Narcissa. This makes a continuous mineralized territory from Baxter Springs, Kas., on the north through Quapaw, Lincolnville and Miami, and on to Narcissa, a distance of 25 to 30 miles.

The Baxter-Quapaw camp is to have three new mills at once. Developments on the Chicago-Quapaw lease have reached a stage that a mill of 150 tons is being built.

The Lucile Mining Co. has let the contract for a new 250-ton plant. The foundations are all installed and the material for the plant is on the ground.

The third mill is the Good Luck which will be a plant of 100 tons capacity. A large dump pile is ready for treatment.

The Miami-Yankee mine is preparing to sink a second shaft southwest of the present one and will be used as a mill shaft. At present all the work is being done through one shaft and there is not sufficient ventilation. The new shaft will greatly add to the development and make ready for the new milling plant which will soon be built. A large amount of drifting has already been done and the new shaft will be able to fully supply the mill.

A new movement has been started by the Emma Gordon Co. in the installation of a roaster to roast the ore and separate it from the impurities which make the ore in this camp a low-grade product. The roaster will render the separation of the ores easier and raise the grade to about 58%.

## MONTANA.

#### Butte.

John A. Ryan, superintendent of the North Butte Extension Co., has returned from New York, where he had been assisting in the readjustment of the financial difficulties of the company. He was called to Butte before matters were settled in New York, but he says there is no doubt that everything will be adjusted satisfactorily in a very short time and work on the property resumed.

Robert H. Gross, president and gen-

eral manager of the East Butte Copper Mining Co., has completed his examination of the property and affairs of the company and has made a report to the directors and officers in Boston. As Mr. Gross is well satisfied with the property and prospects of the East Butte it is likely that an order for a resumption of work will be made very soon. Mr. Gross has reduced the fixed charges to the amount of \$1,000 per month, and has so arranged affairs that the royalties from the precipitating plant and from lessees, who will continue to work on the small veins in the upper levels, will fully pay all fixed charges hereafter. The new funds in the East Butte treasury will be devoted exclusively to sinking and development work. Richard R. Vail is the new superintendent. The shaft is full of water. The East Butte Co. occupies a rather unique position in that it is one of the new companies developing new ground that made good, and one of the few companies in which the original subscribers and stockholders did not lose money.

The new hoisting machinery has been installed on the Colonel Sellers claim by the Butte and New York Copper Co. and the shaft is being unwatered preparatory to a resumption of sinking. A 250-gal. electric pump has been purchased and will be installed at the 700 station. The shaft is to be sunk to a depth of at least 1,500 ft. and a crosscut will probably be driven from the 700-ft. point for the purpose of exploring the veins at that depth. The new engine has a capacity to work to a depth of 2,000 ft. The work is in charge of John Miles. The Butte and New York Co. is understood to be a holding company for the Butte-Milwaukee Co., which was organized to take over the Colonel Sellers and Pollock group of claims, lying north of the Butte and Superior properties.

The Butte-Balaklava Copper Co. states the reason for pooling the company stock to be that a rival company might get control and close the property. This company is now forcing itself into litigation with the Amalgamated Copper Co. to recover possession of the ground secured as a right of way across the Balaklava mining claim about 15 years ago by the Butte, Anaconda and Pacific Railway Co.

The Boston and Montana Co. is installing two new Nordberg quintuplex pumps on the 1,200 level of the Leonard mine. They will have a capacity to raise 600 gals. of water per minute from that level to the surface. The company will install two more in the near future.

#### Taft.

The Amazon and Dixie Mining Co., under the management of Wesley Everett of Wallace, Idaho, will soon be incorporated under the laws of Idaho for 1,500,000 shares at \$1 per share. Five hundred thousand shares will be retained in the treasury. The company will control six claims near the Leslie mine, which have been prospected by 10 open cuts and a shaft down 35 ft. A strong surface showing has been uncovered in the 10 open cuts that cover over 800 ft. in length. Assays show 71% lead and 22.03 ozs. silver. A tunnel 200 ft. below the

open cuts is being driven. Air drills are being used, the power being derived from a Leyner compressor on the Leslie property driven by a 114-gal. water wheel. The air is carried by the Amazon and Dixie through 2,000 ft. of 3 in. pipe. Another tunnel will soon be started at a depth of 1,000 ft. below the present one and driven 1,000 ft. in to tap the ledge. In the upper tunnel some quartzite sprinkled with galena has been taken out. When the lower tunnel is started a 12-drill air compressor and drill sharpener will be installed and a saw mill, bunk house, cook house and other buildings erected. A pipe line will be put in to carry water from the St. Regis river and Copper creek that will give a 350 ft. head and 350 miners inches of water. The company has located the water right and mill site with plenty of timber for a long time.

#### Helena.

L. W. Harriman has taken a lease and bond for eighteen months on the group of five claims owned by William Myhre in the Amazon district, about one mile from the Robert Emmet mine. The terms have not been made public. Minnesota people are associated with Mr. Harriman in the deal.

The Pittsburg-New York Copper Mining Co. of Butte has gained control of the Umatilla property in the new Seven Mile gold district eight miles west of Helena. The group consists of eight quartz veins and two timber veins. On the property is a 5-stamp mill with a foundation ready for five more stamps, which will be installed at once, and a 50-ton cyanide plant. Considerable development by shaft, tunnel, crosscut and open cut has been done and some good ore opened up. One hundred tons of \$25 milling ore is on the dump and this, with the low-grade ore now being taken out, will be milled, concentrated and cyanided. Considerable rich ore is being sacked for shipment to the smelter. The mill is to be increased to 20 stamps and the cyaniding equipment increased. Jerry Mullins is president of the company and W. H. Lindsay, secretary.

## NEVADA.

#### Tonopah.

During the week ending Aug. 8 5,750 tons of ore were shipped from this camp. The total output of the mines for the week was 5,980 tons.

During the week of Aug. 8 the Tonopah Co. broke 180 ft. of new ground on its Mizpah claim and 12½ ft. on the Silver Top. In addition to this about 3,400 tons of ore was extracted from the stopes. Sinking is being continued in the Mizpah shaft which is now down 1,107½ ft. and will be continued to the 1,300 level before any prospecting will be done below the present levels. Core drilling in the Red Plume shaft is being continued. The hole is now 158 ft. below the 500 level of the shaft and will probably be continued to the 1,000 or 1,500 point. During the week 89 out of the 100 stamps were dropping. The total production of bullion, concentrates, etc., for the week was valued at \$94,021.

The work of opening the big ore body

in the shaft between the 350 and 400 ft. points is being pushed. Stringers of high-grade quartz are showing in the east and west drifts now out 30 ft. each from the bottom of the shaft. The raise in the ore body west of the shaft is up 14 ft. and 8 ft. of shipping ore is showing in the top. As soon as the east drift has reached a safe distance from the shaft a raise will be sent up. The entire workings from the bottom of the new shaft are in quartz. Stopping is being done in the big ore body from the 400 level of the old shaft and a good production is being made. Ore from some rich streaks is being sorted and shipped. Considerable other development work is in progress.

Highly satisfactory work is being done in the Belmont mine and considerable ore is being exposed. Raises are being put up on the Occidental vein on the 700 and 800 levels. Drifting and crosscutting is being done on the 900 and 1,000 levels. The winze from the east drift from the No. 4 south crosscut is down 40 ft. and is entirely in ore. At the company's mill at Miller's 55 of the 60 stamps are dropping.

#### Goldfield.

The ore output of the camp for the week ending Aug. 8 was 2,300 tons.

A strike has been made on the Florence-Jumbo (von Polenz) lease. Assays of samples from the full width of the ledge are said to return \$107 to the ton. The strike was made in a winze from the 250 level. It is the intention to install a 50-hp. electric hoist and put three shifts to work. It is expected that the ledge will be encountered on the 350 level.

An important strike is reported to have been made on the property of the Goldfield Fissure Mining Co., three miles east of Florence. The entire bottom of the shaft is said to be in sulphide ore like that of the big mines. This strike opens an entirely new ore system.

All but about 20 miners have been laid off at the property of the Daisy Mines syndicate and no increase will be made until stoping on the known ore shoot is begun. Development work is being done on the 400 level, where the drift is being extended easterly.

A 10-ton shipment has recently been made from the Nelligau and Truxal lease on the Lone Star property. This is the first shipment made from this property since L. L. Patrick and associates ceased work about two years ago.

Work has been resumed at the 385 level on the sinking of the shaft on the Booth property, the object being to tap a rich ledge that runs from the Donnellan lease on the Red Top. A large force of miners is at work. Two leases have been taken on the property on which work was started at once. Air for the power drills is obtained from the Mohawk.

#### Rawhide.

During the last week in July shipments from this camp aggregate about \$33,000, all going to the Utah smelter. It is said that none of the ore ran less than \$100 to the ton.

The Grunt Hill Coalition Co. has encountered the rich vein being explored by the Grunt Hill Mint Co. on adjoining

ground. High-grade free-gold ore is being sacked in the drifts from the 106 level. The crosscut on the lower level has not yet reached the contact, yet the entire face is in rich milling ore. Development work is being pushed and a hoisting plant is soon to be added.

An initial shipment of 10 tons of ore has been made to the sampler at Hazen from the Jordan lease on the property of the Queen Mascot Co. Development work is proceeding underground, and on the surface a shaft house, blacksmith shop and ore bins are being erected. The shaft is being straightened preparatory to installing a hoist which has been ordered.

An initial shipment of 20 tons has been made from the McKinley lease on the Czar claim of the Regent Rector Co. The ledge from which this shipment was taken has a width of 12 ft., all ore. No returns have given less than \$26 to the ton and some very much better.

High-grade milling and shipping ore is being taken from the Waiter Boys lease on the Czar claim. Owing to the inability to treat the ore at the Gates plant on account of the rusty nature of the gold the last shipment was made to the Utah smelter.

Shipments of high-grade ore are being made from the Kearns Nos. 1 and 2 leases on the property of the Rawhide Queen Mines Co. to the Utah smelter. Sinking of the Kearns No. 2 shaft continues. A station has been cut at the 400 level. The shaft is to be carried to the 500 point.

#### Winnemucca.

The new camp of Chafey, 18 miles southwest of here, now has a population of 500 and is rapidly growing.

On the Mayflower claim is the Black Hole mine discovered by E. S. Chafey in May last from which he has shipped since early in June an aggregate of 1,000 tons of ore averaging \$100 per ton in value. About 250,000 tons of ore is exposed. Three shifts of miners are at work driving a tunnel on the vein, now in about 150 ft. Three shifts are also at work sinking a shaft in front of the mouth of the portal to determine the depth of the ore body. This shaft is now down about 40 ft. The width of the shipping ore at both points of extraction is about 5 to 6 ft. Mr. Chafey intends to open the fissure more extensively in the near future.

Some 12 sets of leasers are at work on the same vein system as is on the Mayflower claim.

On the Bishop lease an open cut has uncovered the vein for 150 ft., exposing ore of the same general character as that of the Black Hole. Shipments will be made as soon as transportation facilities are provided.

The Ellihu Palmer-F. M. McBeee lease adjoins the Bishop on the west. A working shaft is being sunk on the vein which averages for 5 ft. of width \$22 to the ton. Rich streaks encountered at a depth of 14 ft. ran very high values. The richer grades of ore are being sacked for shipment.

#### Gold Circle.

A large amount of development has

been done on the R x property and about 4,000 tons of ore said to average \$26 to the ton is now on the dump. On the 65 level a drift has been run 110 ft. all the way in ore on a vein having a width of 14 ft.

Two mills are to be built in this camp soon and a third is to be moved here from California and set up as quickly as possible.

A whim has been installed on the St. Paul property where 10 men are now at work.

A 130-ft. tunnel has tapped a ledge on the Tracy property from which high-grade ore is being sacked for shipment. The entire ledge is said to show good milling values.

#### Granite.

Davis and Warren of San Francisco, who are associated with Smith and McCommer of Shury, have purchased the Granite Mining & Leasing Co.'s lease on the Golden Age property at this place. The new leasers will install modern machinery and push work on the tunnel which is now in 200 ft. A large body of ore is in sight on the property. In addition to this the depth gained there will give over 700 ft. of backs for a custom tunnel to work the Big 20.

The tunnel being driven by Anderson and Gruhe has cut the Big 20 ledge. The pay streak is 20 ins. wide and assays from \$30 to \$40 to the ton. Ore is being sacked for shipment.

The Wilson Gold Mines Co. will transport the 100 tons of ore on its dumps to its mill on Walker river for treatment. Clarence L. Anderson of San Francisco recently took a bond on this property for \$100,000.

A winze has been started on the ore streak in the tunnel on the Star King which showed greatly improving ore values at a depth of 10 ft. On the strength of this it was decided to start a new tunnel farther down the hill to tap the ore shoot at a depth of 150 ft.

#### MISCELLANEOUS CAMPS.

**Golconda.**—Work is being done at two shafts on the property of the Golconda Leasing & Mining Co. Considerable valuable milling ore is on the dump and good ore is regularly being taken from the mine.

**Belmont.**—H. B. Starbird, mining engineer and general superintendent for the Security Reduction Co. of Los Angeles, a company capitalized at \$2,000,000, which has lately taken over the Belmont Amalgamation properties in exchange for stock, placing in the treasury 1,200,000 shares, reports that the new Belmont milling plant will soon be in operation. These claims comprise some of the finest mineral portions of the Belmont district and include 40 patented mining claims D. W. Nefsy of Los Angeles, J. B. Giffon of Manhattan and Capt. Harrison of Belmont are the active directors of the Security Co. The company is installing a 150-hp. Westinghouse and Weber gasoline engine, and 20 stamps are reported in place, which will be supplemented by a Fuller mill, amalgamating and concentrating tables, with modern automatic devices for handling the ores. The new

company, it is stated, will re-open several shafts and give leases, as well as work the valuable dumps accumulated from former milling operations.

**Manhattan.**—The vein for which the Manhattan Humboldt Co.'s tunnel was being driven has at last been encountered. It measures from 40 to 42 ins. in width. The tunnel is now in 415 ft. and will be extended another 20 ft. to tap another large ledge which is known to exist.

The Manhattan Gold Bar Co. has two men at work sinking a shaft on its property and development will be continued from now on.

**Schurz.**—C. D. Rankin is to start a 10-stamp mill on this town site near Walker lake. Work will be begun as soon as the two car loads of machinery now on the way arrive.

## NORTH CAROLINA.

Charlotte.

News has just reached this city of the discovery of gold in large quantities in Orange county, near Oaks. Owners have secured several hundred acres of land and have options on other property. For some time past prospecting has been done in that vicinity. Messrs. Whitman and Little, both of Pennsylvania, have the property in charge and intend soon to install a stamping outfit. Those interested have already spent considerable money.

B. B. Miller of Salisbury, has been named receiver for the Gold Hill Copper Co., located at Gold Hill, Rowan county. The complaint was filed by W. G. Newman of New York, former president of the corporation, the amount due him being stated as upwards of \$300,000. The corporation is capitalized at \$5,000,000. The Gold Hill was the largest producer of gold of all Southern mines before the civil war, and is yet said to be a valuable property. The affairs of the company are now in bad shape, and Mr. Newman feels that his interests and those of the stockholders demand the winding up of the company's affairs.

Mr. Milton L. Jones, of Thomasville, has been appointed permanent receiver for the Iola Mining Co. of Montgomery county. The receiver is authorized to sell the property if necessary. Liabilities are stated to be \$100,000 with assets amounting to between \$75,000 and \$150,000.

## OREGON.

Grant's Pass.

Excellent progress is being made in overhauling, equipping and developing the old Ashland mine of the Ashland district, preparatory to extensive operations. The mine was purchased a few months ago by a company of Los Angeles men. Dr. R. O. Hall is local manager for the company. The Ashland was idle for several years up to the time it was taken over by the present company. It is opened up to a depth of 1,000 ft. The several levels are all being retimbered, and the underground workings overhauled. The stopes are being cleaned out and the drifts and tunnels extended. The ore

body is showing up well and the old mine gives promise of becoming once again a prominent and important producer. It is estimated that the property has already produced in the neighborhood of \$1,000,000. The old mill has been dismantled and a new 10-stamp mill is being constructed at the mine just over the Ashland divide near the main shaft. The mill and power plant are nearly completed and the stamps will be dropping by the middle of August. There is enough ore in sight to supply the plant for continuous operation for a number of years.

A \$400 nugget was found in the sluices of the Sterling mine, Jacksonville district. The annual cleanup of this hydraulic placer mine has just been completed. The total output for the season is known to be in the neighborhood of \$50,000. The Sterling is one of the oldest and richest placer mines in southern Oregon and there is still much ground remaining unworked.

The Red River Mining & Milling Co. is installing a sawmill with which to cut lumber for the construction of flumes, cabins, shops and other buildings on its placer diggings on Mule creek, of lower Rogue river. Indianapolis men are behind this enterprise. T. F. Harrington is superintendent and local manager. A large crew of men is employed in the development and equipment of the diggings. The ground is virgin and has proven rich. Pipe and other hydraulic equipment have already been packed in over the trail. When the flumes and buildings are constructed and the pipe lines laid, the property will be ready to begin operations. Sufficient water to keep two giants in operation for six months of the year will be derived from Mule creek.

One of the busiest mining camps in southern Oregon is Mount Pitt at the head of Jump-Off-Joe, where the Mount Pitt Mining Co. is developing and equipping its property. Portland men are behind this enterprise. A. C. Hooper is manager and superintendent. The Mount Pitt has produced considerable gold during the past four years, but the deeper development and widening of the ledges necessitated a larger reduction plant, which is now being installed to replace the former small stamp mill. Besides the sinking of deeper shafts and the general development of the mine, a cyanide plant, air compressor, machine drills and other modern equipment are being installed. The mine has paid good dividends from the beginning, notwithstanding the heavy expenditure for additional equipment. It will be in shape to begin operations on a large scale this fall or early winter.

A car load of machinery has arrived from southern California and is being placed on the coal beds near Eagle point, of the Gold Hill district. These beds were recently bonded by southern California people. Drillers have arrived and taken charge of the development and prospecting work. They will drive down three or four 2,000-ft. holes in order to fully determine the quality and quantity of coal contained in the beds. If the coal beds prove all that is expected of

them the mine will be developed and equipped for extensive operation. H. B. Wilson is in charge of the work.

## SOUTH DAKOTA.

Deadwood.

The Clara Belle Mine at Oreville was recently sold at a receiver's sale at Rapid City to Cleveland, Ohio, people, and it is probable that operations will be immediately commenced. The property consists of about 200 acres on which a new mill has been built. The cyanide tanks are on the ground, but have not yet been installed. A new shaft is down 250 ft. There is also a railway for hauling ore from the mine to the mill as well as bunk houses, boarding houses and other buildings. About \$80,000 has been spent on the property during the past two years and considerable gold was taken from the old shaft.

Work is progressing satisfactorily on the ground of the Roenna Mining Co. in the Tinton district. A tunnel now in 185 ft. has crosscut numerous veins of gold ore running from 80 cents to \$5 to the ton. The company, which owns 300 acres, is controlled entirely by Ohio men, who own almost all the stock. George M. Williams is president and W. T. Moore is secretary, both of Columbus, Ohio.

Joe Keeler, one of the owners of the Fortunate ground in the Maitland district, has made arrangements to resume work on the property at once. The shaft will have to be unwatered before operations can be commenced. This shaft is down 230 ft. and it is believed that quartzite can be found with another 25 ft. of depth. When that is reached drifting will be commenced to locate the ore shoot that outcrops at the surface.

The Nebraska Mining Co., which is working the Connie May Morris ground near Roubaix, has decided to use the diamond drill for more thorough prospecting. It is the intention to run the drill into the hill on an incline starting where the ore outcrops 500 ft. below the apex of the hill. The drill will also be used on other portions of the property.

Work will be resumed at once on the Old Charley ground near Custer, owned by the Ruberta Mining Co. The work will be in charge of W. W. Olds, one of the chief owners of the property, which has long been one of the most promising in this section. The present 10-stamp mill will be renovated and a roasting and cyanide addition put in, together with greater facilities for crushing the ore.

Under the personal supervision of President Curtis, the work at the Golden Placer Mining & Cyanide Reduction Co.'s property in Blacktail is becoming more nearly satisfactory and the extraction is reaching a figure that is profitable. The Golden Placer secures its ore from the old Kicking Horse mine, seven miles up the gulch. The crushing and grinding machinery is located at the mine and the pulp piped to the mill. At present about 70 tons of ore per day is being handled in this way. This mill was originally built with a unique process to handle the bed-rock placer at small cost, and additional machinery is now being installed to ac-

compleish this end. A slow-speed Chilean mill is being put in and the gravel will be trammed into the plant. The average value of this material is \$7 to the ton in gold. The Chilean mill will crush to a 20 mesh, the pulp being sent over the amalgamated plates and then treated by a cyanide process. Under the present plans the plant will be in complete operation before fall.

In the Rockford district south of here, the Crown property, owned chiefly by James McNickles and others of Chicago, is being put in shape so that a plant of small capacity may be operated in the near future. A tunnel driven into the mountains to crosscut the main ledge showed the whole top of the hill highly mineralized. The present work consists in continuing the main tunnel past the big ledge, which will be opened up from different levels and the ore showing at present is one of the best in the Central Hills.

Near the Crown is another promising free-gold proposition in the North Star property, owned and operated by Frank Caughron. Here a small plant is in course of construction.

## UTAH.

### Salt Lake.

A deal has been completed whereby the Black Jack Co. secures control of the three claims of the Ajax-Mammoth Extension Co. These claims are almost entirely surrounded by the Black Jack property of which Jesse Knight is the principal owner.

Manager Louis S. Coates of the Boston Cons. Co.'s properties at Bingham states that a number of improvements are being made. The foundation has been laid and is now ready for the new compressor. With this equipment in place it will be possible to almost double the output from the porphyry deposits on the properties. Not later than September it is expected that the milling plant at Garfield will be in readiness with its new equipment for the treatment of double the present tonnage of ore. In addition to this work the tunnel, which is to be run 1,500 ft. through the mountain from the surface tramway to the porphyry deposits on the opposite side has been started from each end and is already in a distance of 250 ft. in each of the drifts. It will require about three months for completion. When this work has been accomplished the hauling charges will be cut 50%.

The Colorado Mining Co. has posted a dividend of 12 cents a share aggregating \$120,000.

Officers of the Silver King Coalition Co. have announced that they expect to post the regular quarterly dividend of \$187,500 next month. During the cessation of shipments, which was occasioned by the low price of metals during the first half of the year, the development work at this Park City bonanza was carried on by a force of about 100 men. The mill and sampler were kept in running order by a single shift, and the entire property was prepared to go into commission within a few hours after the signal had been given. The company now has in

the neighborhood of 400 men on its pay roll, and a considerable tonnage is coming from the mine. The mine probably has a larger tonnage of ore blocked out at the present time than at any time in its history. Much territory recently acquired by the company has shown the presence of good ore bodies.

It is expected that the shipment of ore from Utah-Ajax property at Bingham to the Murray smelter will be begun in the near future. For the past eight months the company has been carrying on development work with a force of about 70 men and now has a large tonnage of high-grade ore blocked out.

## WISCONSIN.

### Highland.

Ore production in this camp for this season has been mainly confined to shipments of carbonate zinc or dry bone, the Franklin and Highland Mining companies, marketing five cars of this grade of concentrate weekly, all of which goes to the Mineral Point Zinc Co. for the manufacture of zinc oxide. The price at this time is about \$10 per ton for 30% ore, with 80 cents per unit, up or down, ore carrying over 1/2% lead being slightly penalized.

The Franklin Mining Co. confines its underground operations to the Carey and Lenke tracts, where exploration work shows the heaviest deposits of dry bone in America.

The Highland Mining Co., operating on its own lands for blende ores, have on account of low markets, turned their attention to the production of dry bone, this company averaging about three cars of ore weekly. Forty men are carried on the pay roll.

### Linden.

The Dark Horse recently paid a dividend of 5%. The mine shows up better than any mine in the northern half of the district. Operating with only 15 men, the Dark Horse has in eight months past yielded 1,037 tons of hand-cobbed zinc ore exceeding 60% zinc, this product going to the Matthiessen & Hegeler and the Peru Zinc works, at LaSalle, Ill. The fine ores have been null treated at the Glanville concentrator and recent operations showed 160 tons of high-grade concentrates out of 220 ordinary wagon loads of raw dirt. The water is handled with a combined baby rig pump and hoister of the Galena type and a Weber 20-hp. gasoline engine furnishes the motive power. Three hundred tons of hard hand-cleaned ore is on the dumps and there is enough mill ore in sight to double this quantity.

The Platteville-Linden, Racine, and Mifflin-Linden companies have been closed down since spring. The first mentioned marketed much ore with the Swart electrical separating plant at Platteville. The others have been running on depleted lodes and will depend on new finds before resuming operations in the event of a revival in the mining of lead and zinc ores.

### Cuba City.

The Dall mine, located at Mecker's Grove, about five miles northeast of the

Cuba City camp, was closed down the first three months of the year, operations being resumed April 1. Shipments were confined to lead ore, the blende concentrates, calciner treated, now amounting to 400 tons, being locked in the bins, to be held for higher price. July 1 the company had about \$3,500 debts on its hands, which was reduced during the month to \$1,000, and operating expense paid by sales of lead ore. A new boiler will be installed at a cost of \$1,500 and the balance of accounts will be cleaned up by Sept. 1. Shipments of lead ore in the last 30 days netted the company about \$9,000. Arrangements have been made underground to handle the ore rapidly and economically. The mine is in charge of Charles Burroughs, of Platteville.

### Platteville.

The new certificates of the Wisconsin Zinc Co., the consolidation which includes the Empire, Royal, Acme and Mitchell-Hollow mines, are being issued and distributed among the shareholders of the original investments. Operations under the new management are being conducted on a large scale with a working force of 125 men. The debts of the Acme and the Royal amounting to about \$40,000, were liquidated by the new consolidation and transfers were made through stock deals with the various shareholders. The consummation of the plans of the Wisconsin Zinc Co. means an era of tremendous mine development for the city of Platteville.

Experiments conducted with Wisconsin ores, in the Phillips hot-air concentrator, in the last two years have been highly successful, one run showing less than 1/2% zinc in the tailings. The process will be installed on the grounds of the Klondike Mining Co.

### Benton.

This camp has to its credit the heaviest shipments of both lead and zinc ore of any mining camp in this field.

The New Benton Mining & Developing Co., the recently organized \$600,000 consolidation, has been engaged in issuing the new stock to the shareholders of the various organizations which have gone into the merger. The last deal to be executed is the taking over the assets of the Penna-Benton Mining Co., located on lands formerly known as the Leskey estate and now owned by the New Jersey Zinc Co. The property has been making a fine showing of late in the production of lead ore. The Drum lease, where a fine showing was had in drilling, will be fully developed. Other properties in this camp will be assimilated, notably the Little Bennie, where a fine body of ore was developed through shaft sinking and drifting. It is the intention ultimately to establish a large ore separating plant on track at the Northwestern railway station.

## CANADA.

### ONTARIO.

#### Cobalt.

Shipments for the weeks ending Aug. 1 and 8 were 311 and 387 tons respectively, making a total for the year to Aug.

8 of 12,061 tons. The shipments were as follows:

	Week Aug. 1. Tons.	Week Aug. 8. Tons.	Year 1908. Tons.
Buffalo .....			757,660
City of Cobalt, 42,210 .....			175,110
Cobalt .....			729,380
Cobalt Central .....			233,829
Cobalt Lake .....			342,568
Cobalt Township .....			41,000
Crown Reserve .....			141,681
Drummond .....	62,300	66,800	427,610
Forster .....			178,400
Kerr Lake .....			422,214
King Edward .....	54,630		543,660
La Rose .....	285,040	184,000	1,510,520
Little Nipissing .....			81,247
McIntyre-Dar- rath .....			2,025,200
Nancy Helen .....	48,000		366,047
Nipissing .....	120,600	190,220	3,100,947
Nova Scotia .....			311,775
O'Brien .....	62,790	191,760	3,905,657
Provincial .....			151,680
Right of Way, 121,100 .....			608,810
Silver Cliff .....			25,000
Silver Leaf .....	61,410		258,710
Silver Queen .....			389,190
Temiskaming .....			628,640
T. & H. B. .....			375,928
Trerethway .....	170,250		1,661,740

Corrected government figures show that there were shipped in the first six months of 1908, 9,144,50 tons of ore including concentrates. During the first three months there were shipped 4,402,65 tons of ore containing 3,673,000.47 ozs. of silver valued at \$1,936,840.66.

The deepest workings in the Kerr Lake section are in the No. 3 vein of the Kerr Lake mine in which a winze has been put down to the depth of 400 ft. Some of the richest ore ever shipped from Cobalt has been taken from the lower levels of this vein.

The No. 5 shaft on the Silver Leaf, which has been sunk with varying values to the depth of 190 ft., is producing very good ore from the bottom of the shaft. It is the intention of the management to drift on the vein at the 200 level, to stoop out the 18 ft. of ore between the shaft and the Crown Reserve line. A crosscut is being driven at the 75 level to cut the contact of Huronian slate and diabase. The calcite vein in this contact has been uncovered on the surface for several hundred feet. A diamond drill will be put in operation this week near the northern boundary of the property in the diabase formation.

The most important development in the camp since the discovery of rich ore shoots at 200 ft. in depth on the Temiskaming, is the locating of the Crown Reserve vein in a crosscut at the 100 level in the working shaft. At this shaft is over 200 ft. east of the open cut from which all the shipments from this mine have been made, and the vein where encountered in the crosscut is remarkably rich, the indications are that the vein is continuous from the open cut to the shaft, and that it will prove at least 300 ft. of rich ore. The Silver Leaf shaft is down 190 ft. on the same lead in very good ore. The last car of ore shipped from the Crown Reserve netted nearly \$60,000 and was over 75% low-grade ore. It is unofficially announced that this property will be placed on a regular quarterly 4% dividend basis.

The district in the immediate vicinity of the Keeley claim is still the center of interest in the new silver camp in south Lorrain. No silver finds of importance have been made outside of this area. At the Keeley, three 8-hour shifts are at

work, with a total of 38 men employed. The shaft on the main vein is down 65 ft., and will be sunk to 120 ft., and a drift run at this level. The silver values in this vein are chiefly in the form of wire silver which occurs in vugs in the smaltite. The ore assays considerably over 1,000 ozs. to the ton. Three new veins have recently been uncovered. The No. 1 vein is in the Keewatin formation running at right angles to the contact with the diabase.

On Aug. 8 the directors of the Trerethway Mining Co. declared an interim dividend of 5% to be paid on Sept. 1 to stock holders of record of Aug. 20, 1908. This is a second dividend paid by this company.

On the Whettlauffer claim which lies southeast of and adjoining the Keeley, an open cut 30 ft. long by 8 to 10 ft. in depth, has been sunk on the No. 1 vein. This vein, which occurs in the diabase, is at right angles with the contact with the Keewatin and runs diagonally across the property. The vein matter is smaltite and silver and the wall rock is in places heavily mineralized with native silver. In the open cut this vein is from 8 to 14 ins. wide. Sixty bags of ore have been taken out.

North of the Keeley in the Keewatin formation a shaft has been sunk 105 ft. on the No. 1 vein of the Haileybury Silver Mining Co. The vein matter is calcite, smaltite and niccolite and carries small silver values. A new vein was uncovered on this property last week, which was supposed to be an extension of the Keeley vein. It is decomposed calcite about 10 ins. wide. A new discovery was made on Aug. 5 about one mile north of Loon lake on the Day claim of a vein of calcite with native silver. It has been decided to locate the government dock at the settlement known as "96."

## BRITISH COLUMBIA.

### Rossland.

The shipments of gold-copper ore from Rossland district for the week ending August 8 and for the year to that date were:

	Week. Tons.	Year. Tons.
Centre Star .....	3,750	106,881
Le Roi .....	1,540	50,119
Le Roi 2d. Ltd. .....	35	15,524
Evening Star .....	35	618
Homestake .....	25	25
Carlew .....	35	35
Mayflower .....	35	35
California Giant .....	35	35
Blue Bird .....	145	145
Red Eagle .....	29	29
Sunset .....	25	25

The weekly shipments from Rossland are in good numbers now and the mines are earning a reasonable profit.

The lessees of the Evening Star have installed a small steam plant on that property and expect to ship more ore each month in the future than they have been doing in the past. The lessees of this claim and those who have the Blue Bird leased have made money from their enterprise but most of the other miners who have leased have only paid expenses or a little over. The Blue Bird lessees continue to extract ore.

### Phoenix.

Our shipments from the Boundary dis-

trict were lighter during the last week being partly affected by the possibility of the local smelters running short of coke in consequence of the partial destruction of the coke-making apparatus at Fernie. It is not certain yet, however, that such a crisis will arise. Some of the Pacific coast collieries have advised the smelter managers in this district that they can assist them with a large quantity of coke in case they find that they will require a supply from outside points. The British Columbia Copper Co.'s and Granby smelters have a 10-days or two-weeks reserve of coke on hand, but the supply at the Boundary Falls smelter is only sufficient to last five or six days.

The ore shipments from the district for the week ending Saturday, Aug. 8 and for the year up to that date were:

	Week. Tons.	Year. Tons.
Granby mines .....	16,000	640,566
Mother Lode .....	10,406	88,674
Oro Denoro .....	3,750	25,738
Brooklyn .....	550	4,970
Roughside .....	930	9,230
Sunset .....	621	2,459
Mountain Home .....	60	375
Athelstan .....	120	120
Bowenhoe .....	267	267
Sully .....	89	89
Crescent .....	50	50

A tunnel is being driven on the Golden Eagle, North Fork. Enough ore will be taken out during the progress of the work, it is expected, to pay the expenses of driving.

A contract has been let for 200 linear feet of work on the Lauretta, Franklin camp. Shipments will be made from Granby Co.'s Bear Creek property in the Similkameen district this property as soon as the V. V. & E. railway now as far as Hedley, reaches that section. Large bodies of shipping ore have been blocked out in the Bear Creek mine.

### Nelson.

The shipments of high-grade ore from this section for the week ending Aug. 8 amounted to 2,647 tons and for the year to that date 56,807 tons.

A 2-ft. ledge of galena ore has been cut in the Reco mine at Sandon. Steady shipments are being made from the Silver Cnp, at Ferguson, and development is well advanced. Sixty men are employed at present, working four stops.

A strike has been made on the Nugget mine, Sheep creek, that further development may show to be a very important one. The shoot was cut in a drift at an unexpected point and samples taken give high assay values, chiefly in gold.

## MEXICO.

### Chihuahua.

An interesting item to the mining fraternity of this state, as well as of Coahuila, is the report of the possible early building of a line of railroad from Monclova, Coahuila, on the National Co.'s line, to the city of Chihuahua. Credence is given to the report from the fact that engineers are now in the field making a reconnaissance of several proposed routes, which are projected through proven and undeveloped mineral territory.

The Mexicana-Urique Mining Co. has begun development operations at several properties in the Urique section, reached



from Creel, the present westerly terminal of the Orient railway. The work is in charge of John Paul, second vice-president and general manager.

The June production of the Rio Plata Mining Co.'s Santa Barbara mine in the Guazáres section was 90,000 ozs. of silver. Superintendent H. W. Edmondson also reports that the newly exposed ore body is fully 5 ft. in width and carries average silver values of 250 ozs. to the ton. At present the lower-grade ore is concentrated, but the tailings are being accumulated for subsequent treatment by cyanidation. Good progress is being made in the erection of the cyanide plant, which is expected to be in operation about the first of next year. The company's general manager, D. W. Shanks, is temporarily in Los Angeles on business.

The American Smelting & Refining Co.'s smelting plant near Chihuahua is operating steadily with two furnaces, while a third is being made ready for blowing in as soon as the ore supply warrants. The ore supply comes from camps in this and neighboring states.

The Dos de Abril Mining Co. lately made a very successful trial run of its 5-stamp amalgamating plant in the Dolores section. It is anticipated that uninterrupted milling operations will begin shortly. It is also the plan to later add concentration and cyaniding equipments to the present plant.

The Southern Mining Co., which lately suspended mining and milling operations at its properties in the Ocampo district, is to resume work again under the direction of S. H. Worrell.

The Seawell-Robinson-Terrazos lead-silver properties in the Lameritos district of the northern part of the state were lately bonded to George P. Squires of El Paso, Texas, who is presumably acting in behalf of the American Smelting & Refining Co. in the acquisition. Development works is to be shortly inaugurated in a large scale.

The Candamena silver mines in the Ocampo district are producing at the rate of about 20,000 pesos monthly. The ores are treated in a 5-stamp-amalgamation-lixiviation plant on the ground. The controlling owner is Jesus Royval.

Among the companies reported to be planning on the resumption or increase of operations are the Mexican Mines corporation in the Almohaya district, Ibarra de Cabre, Uruachi, Las Vegas, Cherokee, Lluvia de Oro and Saluayacan, all of which have been more or less successful in operations heretofore.

The Coyame zinc mines of Henry Faivre continue to produce rich ores, the last car lot running about 53% zinc. It is marketed with the Vogelstein agency at Chihuahua.

The Old Dragoon Mining Co.'s Columbia properties in the Terrazas camp are reported to have been acquired by the Corrigan, McKinney & Co. interests of Cleveland, Ohio. The latter concern is now carrying on extensive development work at neighboring copper properties, under the name of the San Rafael Copper Mining Co., with R. B. Hutchinson, manager, and Capt. M. D. Murray, superintendent. The Columbia properties were formerly owned and operated with

some success by the Federal Copper Co. of El Paso, Texas.

The production of the Parral camp for the week ending Aug. 1 was 9,290 tons, of which 5,940 tons was treated at local milling plants and the balance sent to outside smelters. The July output was 28,935 tons, as compared with 34,525 tons in June.

#### Guanajuato.

Henry E. Crawford, a New York mining engineer, representing the Marcus Daly estate, is now in this state investigating mining properties with a view to heavy investments. He will examine several mines in Hostotipaquillo district. Mr. Crawford has already opened negotiations with the local Mexican company owning the Los Reyes mines in the San Sebastian district of Jalisco, and it is understood that if satisfactory terms can be secured the mines may pass to the Daly interests. The mines have been steady producers for a number of years and several bonanzas have been encountered.

Ferdinand Sustersic of this city, formerly general manager of the Amparo Mining Co., has secured an option for 12 months on the Los Reyes group of seven mines, comprising 76 pertenencias, in the Tamazula district, state of Durango. The price named is \$1,000,000. The group is owned by Hilario Losoya of Durango. Up to the time of expiration of the option Mr. Sustersic can either lease or purchase. If he does not decide to lease the mines and work them for his personal account, it is probable that American interests will undertake their purchase under his option. From 1900 to 1905, in which year they were shut down, the Los Reyes mines produced 50,000 kilos of silver. All the ore was shipped to the Torreón smelter. The cost of transportation to Santiago Papasquiaro, the nearest railroad point, was over \$50 a ton. Power for mining and milling purposes is available along the Remedios river near the mines, and it is believed that the investment necessary for power development and reduction facilities would bring big returns.

Leonard Groce, representing St. Louis parties, is preparing to unwater the old Descubridore mine in the Ameca district of this state. The mine is the property of Glanville Hart of Ameca, and is under option to the men represented by Mr. Groce. A steam pump is now being installed and the old workings will soon be unwatered and put in shape for new development. The main shaft has a depth of 420 ft.

Glanville Hart, who owns several mines in the Ameca district, is now working the Providencia gold mine at Palo Alto. He has erected a small reduction plant and is turning out bullion.

#### Cananea.

Authentic information has been given out to the effect that the famous El Tigre mine has been bonded to the Phelps-Dodge interests for the sum of \$8,000,000. The owners have been getting good results, despite the fact that they have had to make long hauls to get their ore to a shipping point. This difficulty will

be removed by the bonders, who will build a line from their road from Nazcozari to the mine.

The Cananea Northern Copper Co., which has been inactive for nearly a year, held a meeting last week, at which the following officers were elected: A. T. Sowl, president; H. B. Hanscom, secretary; I. W. Wallace, treasurer; A. T. Hoy, Galen F. Humbert, L. R. Allen, G. Neely, C. P. Solander and B. S. Morse, directors.

This company secured its property about a year and a half ago. The property was formerly included in a concession to the Greene Co. Titles from the Mexican government have been secured for the Bonanza Extension, also which makes the entire holdings of this company over 1,000 acres. An abundance of wood and water is included in the rights and the Cananea Cons. Copper Co.'s railway runs within less than a mile of the southern boundary. Development and prospecting will be begun at once.

The Suerta Mining Co. was organized last week in Cananea as a Mexican corporation. The property lies in the Santa Cruz mountains west of Cananea and embraces 60 pertenencias. A shaft is down about 40 ft. and a small force of men is employed regularly. The officers are: Harry Lane, president; John F. Evans, vice-president; W. R. Peters, secretary, and Luis Lease, treasurer. Mr. Lane has charge of the work at the mine.

R. Lopez, of the Lampasas mine, made another shipment of rich ore to Douglas, Ariz., last week. Messrs. Heller and Wright were the buyers, the price aggregating \$5,000.

Work at the Transvaal mine is progressing satisfactorily, more men being employed now than a year ago and better prospects are being encountered.

D. A. Richardson was in Cananea this week arranging the details for the sale of the Roy Cons. Mining Co. Financial difficulties and a difference of opinion among the stockholders have necessitated the sale.

Work is still being carried on at the Creston de Cobre mine, west of Hermosillo, in a satisfactory and prosperous way. A slight change was made in the official staff at a recent election. W. T. Calderwood of Oxnard, Cal., is the new president, and S. F. Wiles is general manager.

The Dorotea Mining Co. is in process of reorganization. The closeness of this company to the Cananea Cons. Co., which buys its ore, forced it to suspend operations last fall, but, with the big company's smelter running there is now no occasion for idleness.

The Cananea Cons. Co. expects to have six furnaces in operation by the last of this month.

The Greene-Cananea is now treating 2,200 tons of ore daily, of which 700 tons goes directly to the smelter. The monthly recovery of copper is approximately 4,000,000 lbs. The gold and silver values amount to 1½ cents per pound of copper produced. It is said the total monthly expenditures are within \$300,000, indicating a cost of production at the mine of not more than 7½ cents per pound of copper.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The offices of the Georgia-Tennessee Phosphate Co. have been moved from Baxter to Boma, Tenn.

The Greene Gold and Silver Mining Co. has paid its employees in Chihuahua, Mexico, their back salaries, due for several months.

The Old Dominion Copper Co. has reduced its floating debt to something more than \$100,000, and has supplies paid for to the value of \$600,000 to \$700,000. The remainder of its floating debt will soon be wiped out.

A plan is under consideration involving a practical reorganization of the Davis-Daly Estates Copper Co., the acquisition of additional property and securing working capital. It is desired to submit the plan direct to stockholders.

The property of the Copper Belle Mining Co., at Gleason, Ariz., has been sold at sheriff's sale to N. L. Amster, of Boston. The deal included the taking up of two mortgages, interest, and court costs. The amount paid was \$90,000. The first mortgage was held by John Gleason and amounted to \$21,000.

Judgment has been entered against the Miners Grubstake Co. of America, an Arizona corporation, in favor of Gaylord Wilshire for \$11,708, due on a demand note of the company dated May 25, 1908. The Miners Grubstake Co. is a promotion of J. Bushnell Sperry, who originally promoted the Bishop Creek Gold Co.

The Cheshire Oil & Gas Co. has gone into the hands of a receiver as the result of two damage suits filed at Gallipolis, O., by the Citizens' Trust Co. of Trenton, N. J., for \$103,000, and one against President C. R. Richardson of New York for \$51,500. Sam A. Dunbar was appointed receiver. The company will be reorganized.

Upon application of New York creditors the Gold Hill Copper Co., located on Gold Hill, Rowan county, N. C., has been placed in the hands of B. B. Miller, of Salisbury, as receiver. The concern is capitalized at \$5,000,000. The claims of the chief creditor, Walter George Newman, formerly president of the corporation, aggregate \$352,000.

A meeting of the directors of the North Butte Extension Copper Co. has been called for the purpose of authorizing an issue of \$400,000 first mortgage 6% 5-year bonds. Of this issue it is planned to sell \$200,000 and to retain the remaining \$200,000 in the treasury for further development work. The issue is declared necessary to place the company in working shape and to clear it of debt. The largest stockholders have expressed their willingness to subscribe for the bonds.

Deputy Sheriff Murray has received an attachment for \$14,250 against Manhattan Cobalt Limited, a Maine corporation, whose offices are at 25 Broad street, New

York, in favor of Martha A. Pardee on ten notes of the corporation. The sheriff levied upon 85,000 shares of stock of the Manhattan Cobalt Mining Co. and 84,890 shares of stock of the Manhattan Cobalt Mining Co. of Quebec. The attachment was granted on the ground that it is a foreign corporation. It was incorporated in November, 1906, with a capital stock of \$12,000,000.

### Official Reports.

#### RANGOON (BURMA) OIL CO.

For the six months ended March 31, 1908, a net profit is shown of \$206,750, after deducting \$16,000 to the account of depreciation, \$5,000 due to the late managing agents, and \$730 for securing leases for territory. The shareholders will get a dividend of 50%, and a balance of \$47,384 will be carried forward to next account. The property controlled by the company is just at the threshold of development and has a contract covering its output for 10 years at a price that will pay a handsome profit. The paid-up capital is \$318,700, and the reserve amounts to over \$100,000.

#### LA ROSE MINES, LIMITED.

The preliminary statement of production and earnings for the months of June and July, 1908:

	JUNE.		
	Tons.	Contents.	Net Value.
Shipments	172,748	116,088	\$55,400.25
On hand June 30	41,591	77,711	38,267.
Production	229,735	193,799	93,867.55
Estimated Expense			\$11,000.
Net Profit for June			\$82,867.55

	JULY.		
	Tons.	Contents.	Net Value.
Shipments	507,110	307,469	\$140,793.
On hand July 31	57,940	78,739	38,802.
Production	565,050	385,198	\$179,596.
Loss on hand June 30	41,591	77,711	38,267.
July Production	522,059	307,487	\$111,329.
Estimated Expense			\$14,000.
Net Profit for July			\$127,329.

	Tons.	Contents.	Net Profit.
Total for June and July	742,798	501,286	\$210,196.

#### REPUBLIC IRON & STEEL CO.

Earnings of the Republic Iron & Steel Co. in the year ended June 30, as shown in the annual report, just issued, were considerably better than had been expected since the preferred stock dividend was passed some months ago.

The report indicates that the company earned the full 7% to which the preferred shares are entitled and a balance

equal to virtually 2% on the outstanding common stock. The passing of the dividend, therefore, was not due to a failure to earn it, but to a provision in the company's mortgage requiring the balance of net quick assets to be kept above \$650,000. As a matter of fact they are now above that amount—\$6,713,000—but not far enough to permit the payment of dividends.

The volume of the company's business during the year was about 54% of its capacity. The orders on hand at the end of the year called for 283,743 tons of material, or about 60% of the unfilled business on hand at the end of the preceding year.

The company's income account for the year compares as follows:

		Decrease.
Net earnings	\$3,948,514	\$2,069,146
Interest and repairs	1,000,071	99,329
Other income	2,948,443	1,969,317
Profits	98,176	11,208
Total income	3,046,619	1,981,123
Improvements, etc.	437,590	186,436
Net profits	2,409,720	1,794,688
Fixed charges	437,300	28,863
Available for dividends	1,972,420	1,767,825
Unf. dividend 5%	1,071,887	557,296
Surplus	899,523	1,200,529
Previous surplus	2,339,994	769,710
Total surplus	4,639,527	723,819

\*Increase.

The balance sheet as of June 30 is as follows:

ASSETS.	
Real estate, plants, machinery, etc.	\$53,092,152
New construction	906,636
Cash	667,983
Bond redemption 5% gold bonds	2,892
Stocks in other companies	862,325
Raw and finished material	4,547,989
On contract payables	800,206
Accounts and bills receivable	2,362,248
Prepaid royalties, mining expenses, etc.	715,292
Total	\$62,964,820

LIABILITIES.	
Preferred stock	\$20,416,900
Common stock	27,191,000
First mortgage bonds	5,546,000
Potter ore bonds	345,000
Accounts and bills payable	1,362,225
Accrued interest	108,535
Accrued taxes	103,263
Depleted reserves on coal lands	706,737
Reserve tax and insurance	237,812
Contingent reserve	25,849
Reserve for retreating furnaces	54,707
On contract balances	96,235
Unpaid dividends	2,746
Surplus	4,639,526
Total	\$63,964,820

The report states that the company's northern ore reserves increased 4,000,000 tons during the year, the total northern reserves now being 35,000,000 tons. The southern reserves are estimated at 88,000,000 tons.

#### Consumption of Copper in Germany.

The consumption of foreign copper in Germany for the first six months of 1908 according to figures furnished *The Mining World* by L. Vogelstein & Co., 100 Broadway, New York, is as follows: Imports of copper, 82,968 tons; exports, 3,878 tons; consumption, 79,090. For the same period in 1907 the consumption totaled 76,750 tons.

With a view to encourage the study of mining, the governments of Bengal and East Bengal and Assam intend to give scholarships to students who will study the subject in the Shipburn Engineering College.



## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise.

(See also Market Reports)

[illegible]

### Latest Quotations on American and Foreign Mining Stocks.

**Copper, Gold, Silver, Lead, Zinc, Quicksilver**

(4) Dividend Payers. (5) Levy Assessment

[illegible]

## Mexico.1

Name of Company.	Bar's	High.	Low.
DURANNO:			
Alper, non-asset .....	...	\$0.00	\$5.00
Frontier, non-asset .....	...	...	...
Frontier .....	\$300	1,500.00	\$10.00

9.

Anglican .....	2,000	25.00	97.00
Cinco Sen. assem .....	2,000	15.00	15.00
Cinco Sen. con assem .....	400	50.00	10.00
Latins, assem .....	1,000	11.00	7.00
Latins, non assem .....	2,000	50.00	80.00
Prov. B. J. de la Lata .....	2,000	142.00	138.00
Roma, San F., (mid) .....	2,000	95.00	94.00

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Acetilian, non-accom.....	2,000	12.00
Calandrina, accom.....	8,000	15.00
Calandrina, non accom.....	8,000	10.00
Cerros Alto, accom.....	2,000	1.50
Cerros Alto, non accom.....	8,000	10.00
Columna, serie 1 and 2.....	4,000	30.00
Defina, 1 y 2.....	5,000	12.00
Defina, 3a.....	7,000	8.00
Guadalupe y An.....	800	25.00
Guadalupe Torres, accom.....	4,000	25.00
Julietta.....	4,000	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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Alameda y Concordia.....	12,800	75.00	79.00
Alameda y Anasco.....	15,500	81.00	84.00
Alameda y San Juan.....	13,000	75.00	78.00
Maravillas y An. amano.....	1,000	50.00	50.00
Maravillas y Lobo.....	1,000	50.00	50.00
Verde y Alamogordo.....	1,000	50.00	50.00
Verde y Alamogordo, (old)	1,000	50.00	50.00
Palmito.....	11,000	30.00	30.00
Robles y An. new.....	1,700	50.00	50.00
*San Rafael and A. Tr.....	1,800	84.00	85.00
*San Rafael and Amano.....	1,800	84.00	85.00
San Rafael and A. Tr.....	1,800	84.00	85.00
San Rafael and A. Tr.....	1,800	84.00	85.00
*Santa Gertr. y Verde.....	60,000	71.00	71.00
Santa Ursula.....	8,000	100.00	90.00
San Juan.....	1,000	50.00	50.00
Santa Gertr. y Verde.....	60,000	71.00	71.00

100

Alcoran, asen.	1,900	60 00	60 00
Alcoran, non-asen.	950	60 00	60 00
And. Despen.	2,000	30 00	30 00
Carbondale 7 A.H.	2,000	300 00	300 00
Guad. Los Reyes	2,000	20 00	20 00
Ore Holms	2,375	200.00	240.00
Reforma, asen.	2,000	60 00	60 00
Reforma, non-asen.	2,000	30 00	30 00
Union, asen.	2,000	40 00	40 00

.....

Aldebaran, non-assess	2,000	7.00	7.00
Borda Ant. assess	2,000	25.00	15.00
* Dos Estrellas (El Oro)	600,000	94.00	94.00
Equidad, la y 3a, non-assess	1,000	35.00	55.00
Equidad, PT.	800	25.00	80.00
Equidad, pr.	2,000	34.00	90.00
Los de Borda, assess	2,000	2.00	31.00

Amount	1,00
--------	------

Banco y Ail, asens	2,000		
*Actividad	2,400	80.00	87.00
MISCELLANEOUS:		100.00	170.00

1999

Alhambra, asomero	2,000	\$4.00	\$8.00
Barcelome de Medina	2,000		
Gloria, asomero (L.H.)		\$50.00	\$50.00
Ign. Rod Ramos (Chis.)			
Misera del Baitile (Cosh.)	1,000		
Notas de Rajan (N. Long)	1,000		
San Francisco Pachura		\$50.00	\$50.00

#### Assessments Levied.

[illegible]

San Francisco.†

Name of Company.	Par Value.	High.	Low.
Airplane.....	\$1		
Alpha.....		.86	.80
Alma.....		.19	.18
Alton.....		.19	.17
Belcher.....		.19	.19
Bell & Schickel.....		.19	.19
Bullion.....		.19	.19
Caldwell.....		.14	.13
Chalmers Co's.....		.67	.66
Columbia.....		.17	.14
Confidence.....		.69	.64
Cos. Imperial.....		.19	.19
Cos. Virginia.....	5%	.74	.74
Dallas.....		.19	.19
Karshner.....		.27	.26
Lewis & Clark.....		.19	.18
Hale & Norcross.....		.21	.20
Mile.....		.19	.19
Jewett.....		.33	.29
Johnston.....		.69	.69
Lucy Washington.....		.26	.26
Maple.....		.26	.26
North Union & Curry.....		.33	.33
North York.....			
Oxydation.....		.80	.76
Pacific.....		.80	.76
Seward.....		.11	.09
Strom.....		.19	.19
Richmond Barrels.....			
Shaw.....		.21	.19
Shaw.....		.21	.19
Shaw, Hunter & Mids.....		.29	.29
Shaw.....		.31	.29
Henry Nevada.....		.19	.18
Los Lomis.....		.19	.18
Union Cos.....		.26	.26
Yellow Jack.....		.04	.04
Yellow Jacket.....		.67	.56

## matock Mine.

London (BY CABLE)

Name of Company.		High.	Low.
Camp Hrd, Colo.	\$5	85.50	87.125
Chlorine, Mex.	0	7.375	6.125
Co Oro, Mex. (ex-dis.)	0	7.00	6.00
Co-berona, Mex.	0	15.675	14.75
Met. Mines, El Oro (ex div.)	0	95.50	95.50
Microfilm Doreing, C.	0	1.00	0.75
Plumb, Colo., (ex-div.)	0	6.00	5.00
	.....	.....	.....
2000 22 12 2011 2000 22 12 2011 2000 22 12 2011	2000	200	.....

**Toronto.**

Name of Company.	Par Value.	High.	Low.
Amalgamated	\$1	\$3.00	\$2.00
Cobalt Lake	1	1.54	1.14
Cominco	1	1.50	1.30
Porter	1	.68	.37
Greenbushes	1	.14	.11
Kerr Lake	1	2.00	1.80
LaRue	1	5.70	4.40
New Tecumseh	1	.34	.28
Nova Scotia	1	.20	.17
Twickenham Lake	1	1.18	1.04
Red Rock	1	.20	.16
Silver Lake	1	1.15	1.04
Proctor	1	.60	.50
White	1	.60	.50

#### Dividends Declared.

[illegible]

## Dividends of Foreign Gold, Silver, Lead and Copper Companies

[illegible]



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\* Illustrat—

## Work of Standardization Committee.

In an editorial in The Mining World of June 13 attention was called to the continuation of the work of standardization undertaken by the Institution of Mining and Metallurgy of Great Britain, with particular attention to the attempt to establish uniform methods for reporting assay results.

The sectional committee in charge of this work has formulated six questions, which follow, on points where changes are considered desirable, and has asked for suggestions from members:

(1) Do you approve that, wherever possible, assay values of gold and silver ores and products shall be reported in ounces and decimals, or pennyweights and decimals, rather than in ounces, pennyweights and grains? [Note.—For ores and products where the use of pennyweights rather than ounces would not be unduly cumbersome, it is suggested that the former be always used.]

(2) Do you approve that assay values of alluvials shall be reported in grains and decimals of a grain of "fine" gold, or in penny (at 2d per grain of "fine" gold) or cents per cubic yard or per ton? If reported per ton, should one cubic yard of ordinary damp alluvial, excluding boulders, be taken as equivalent to 3,000 lbs. or in penny (at 2d per grain of "fine" gold) or cents per cubic yard or per ton? [Note.—The value of 2d per grain is suggested as convenient and sufficiently accurate. At 5s per oz, the value would be 2.125d per grain. The figure of 3,000 lbs. (1½ short tons) is commonly used and is suggested as a convenient factor.]

(3) Do you approve that in cases where money values are given for assays of silver, copper, tin and other metals whose value fluctuates, the market price of a stated quality or brand of the metal, as taken for calculating such money value, shall be given, together with the assay value in ounces, etc., per ton, or in per cent. or other concrete quantity?

(4) Do you approve that in reporting assay values of cyanide or other solutions (a) results shall be reported in ounces or pennyweights, etc., in a stated volume of such solutions? Or do you prefer (b) the use of the ton of 2,000 lbs. instead of volume?

(5) Do you approve that in reporting assays of silver and gold products and ores, the assayer shall state on his certificate whether the slags have been "cleaned" and allowance made for cupel absorption?

(6) Do you approve that all assay reports shall state the exact condition of the sample as to dryness, when assayed?

The following six definitions have already been adopted by the Institution:

(a) The word "ton" shall represent a weight of 2,000 lbs. avoirdupois (20,160.6 ozs. troy). [Note.—It is advisable to abandon the use of the terms hundred weights and quarters, and to express fractions of a ton in lbs. or in decimals of a ton.]

(h) Returns of gold and silver shall be expressed in terms of fine gold and fine silver respectively, not as "bullion."

(c) Gold contents of ores, etc., determined by assay, shall be expressed in money values as well as in weights; and in this connection the value shall be taken (as a convenient constant) at 85s, or \$20.67 United States currency, per troy ounce of fine gold.

(d) Temperatures shall be expressed in degrees Centigrade.

(e) The word "gallon" shall represent the Imperial gallon measure of 10 lbs. of water.

(f) Laboratory sieving tests shall be made with the I. M. M. Standard sieves, or, when other sieves are used, the widths of the apertures shall be stated.

The first question is in regard to the choice between expressing gold and silver assay values in terms of ounces and decimals of an ounce, or by ounces, pennyweights and grains, and the committee advises the decimals of an ounce, which, of course, is the more rational.

Question 2 relates to the advisability of expressing the values of alluvials in terms of grains of fine gold or penny or cents per ton or cubic yard. The ton should surely be preferred to the cubic yard, for it is an exact unit, while the cubic yard is not, the amount of material in the latter of gravel, earth, etc., varying with the specific gravity and the looseness of the material.

In commenting on questions 5 and 6 it may be said that when an assay report is to convey accurate information, all conditions affecting the values found should be noted. The assayer, when he renders a report, assumes the responsibility of making a report that is intelligible.

The attempt of the Institution to bring about greater uniformity and clearness in assay reports is laudable, but we believe that, to be of the greatest good, efforts should be directed along lines leading to the establishment of international standards, and should not be confined to the exchange of one cumbersome system for one only a little less cumbersome. Whatever change is made from an old established custom will, of course, meet with a certain amount of opposition. The suggested changes simply mean a prolongation of a clamor for the decimal or metric system of weights and measures, which must come in time, and which, once accepted, will give a foundation for the simple expression of all measures and values that will be intelligible to people of most nations.

Why adhere to the arbitrary pound, ounce, pennyweight, foot, yard, etc., when, by adopting the metric system with a common basis for weights and measures, the mental strains of computations and much cause of errors would be eliminated? The assay report of an English-



man would then be equally intelligible to the American, the Frenchman, the German or Mexican.

The Institution has undertaken a herculean task in its attempt to establish uniformity of standards. There is surely a need for it. The belief is general, however, that a system, the use of which is confined to one or two countries, falls far short of being an ideal one. With the ever-increasing industrial and commercial relations between people of different nations, the need of international standards is steadily becoming of greater importance. The common basis, with which all are more or less familiar, on which all could meet, is the metric system of weights and measures.

### Protection Against Mine Explosions.

As further evidence to impress one with the great importance of the work of investigating the causes of explosions in coal mines is the recent frightful accident in the Maypole mine at Wigan, England, which resulted in the death of some 70 miners. Occurring, as it did, in a country where the death rate from such causes has been remarkably low, it gives added emphasis to the needs of a deeper knowledge of causes and means of prevention of this ever-present menace to the lives of the workers in collieries.

Great credit is due to those investigators in England, Germany and elsewhere in Europe, who have been working on the problems relating to gas, coal-dust and powder explosions in coal mines. The safety lamp, developed practically in its present form by Davy, and which has been the means of saving countless lives, was a product of English brains.

Of next importance to the prevention of mine explosions is the perfection of means of saving the lives of those caught below and were not killed outright, but who would soon be overcome by the deadly gases or "afterdamp" produced by the explosion. Considerable progress has been made in the development of rescue respiratory apparatus, by the use of which rescuers may safely venture into the foul gas atmosphere without waiting for ventilation to be restored.

There is little to be proud of on this side, either in the record of casualties from explosions in coal mines, or in contributions to the knowledge that would tend to mitigate the evils of explosions or lessen their number. It is not that Americans lack the ability to carry out these investigations, or that mine operators are indifferent to the welfare of their employees, but rather that there has been a lack of centralized effort directed to the

solution of these problems and the applications of results, and a lapse of vigilance on the part of both miner and operator in watching for and avoiding dangers.

We are, however, no longer to remain behind in research and experimental work in this direction, for in response to an invitation extended by the United States government on behalf of the Geological Survey, Great Britain, Germany and Belgium have sent to this country their leading experts in the prevention of mine disasters, to aid in the inauguration of safeguarding the mines here. Experimental stations have been in operation for a number of years in each country mentioned with the result that the death rate of their mines has been reduced to a minimum.

In company with the expert in charge of the technologic branch of the survey, the party will visit the anthracite fields of Pennsylvania, the bituminous fields of Western Pennsylvania and the coal fields of Illinois, Indiana, Wyoming, Colorado, Alabama, West Virginia and Oklahoma, in order that they may learn the conditions under which coal is mined in this country.

The results of this work of the Geological Survey, added to the knowledge already gained, will go a long way in providing the exact information necessary to instruct the coal miner as to those things he should or should not do to protect the life of his co-worker and his own from mine explosions in their various forms.

It can hardly be hoped to absolutely prevent these catastrophes as long as man remains fallible. The human factor must always be reckoned with. No amount of education will make all men careful at all times, yet education will be of vast good. Of equal importance is discipline. State mining laws must first be adequate to prescribe the regulations necessary to promote safety. These laws must then be rigidly enforced. Both operators and miners must be made to feel their responsibilities. They must have the knowledge and be compelled to use it.

The first work of the commission to be appointed by the president for the preservation of the natural resources of the United States will soon be transacted in Chicago, which is to be the headquarters of the commission. Gifford Pinchot, chief of the Forestry Bureau, was in Chicago this week with others and arrangements were perfected for starting activities. A schedule of inquiries, prepared by the National Business League and having to do with the natural re-

sources of the country, is being sent forth broadcast from the headquarters of the league in Chicago by A. A. Burnham, the secretary. The action of the league was taken at the request of Mr. Pinchot. From the returns received Mr. Pinchot will compile in part the data on the resources of the country. The subjects for investigation have been arranged under the five heads of "Waters," "Forests," "Lands," "Minerals," and "Other Resources." Under the head of "Waters" information is asked as to the extent to which inland waterway traffic has decreased and the advantages of an adequate system of inland waterways for navigation.

Something seems to have gone wrong with the plans of the Montana Mine Owners' Association, which was organized for the express purpose of fighting the "smelter trust." It will be remembered that the association took a 5-year lease and option on the Panhandle smelter early in the spring and was to have had it blown in about the middle of May. The plant was to be overhauled and its capacity increased from 500 to 1,000 tons daily. Independent mine operators were notified to get ready for ore shipments and various dates were set for the beginning of operations. But all talk has now ceased and nothing is heard from the officials of the company, leaving the impression that the association as a body had ceased in "the business of trust busting." The latest information is to the effect that the Greenoughs have secured control of the smelter and will start it up soon.

On another page appears an article on beach placers of the south Pacific coast, by C. B. Irvine. Considering the vast accumulations of black sand carrying gold, platinum and other values found on the Pacific coast, and the difficulties that have been and are being experienced in extracting these values commercially, any information bearing on this subject is of much interest. In addition to giving some of the results of treatment tests made by the government, Mr. Irvine gives a summing up of the investigations as to the origin of black sand, and the uses to which it is applied.

Despite the so-called money stringency there is today an earnest and persistent search for lignite, partially developed mining properties, requiring large capital. The men who have made their money in mining realize its marvelous possibilities and hence are willing to risk unlimited sums in backing their judgment or that of their engineers.

# Mining and Smelting on Shasta Copper Belt.

By AL. H. MARTIN.

The Shasta copper belt is located in the northwestern portion of Shasta county, Cal. The district is divided by the Sacramento river into an east and west belt, differing materially in general formation and ore characteristics. The leading properties of the belt are located on the west side, where the ore bodies are of far greater dimensions, but the east side is notable for the richness of the deposits of copper and precious metals. The copper ores carry a good percentage of gold and silver.

The belt on the west side of the Sacramento river, known as the Balaklala rhyolite, is formed by a succession of flows. The main ore bodies are composed of heavy sulphide with pyrite largely predominating. At relatively considerable distances from the main veins are small deposits of sulphide, consisting principally of chalcopirite associated with secondary silica. Little pyrite is observable in these smaller deposits. Up to the present time no intrusives have been found in the Balaklala rhyolite. The ores contain excessive quantities of iron, necessitating considerable silica for fluxing. A 35 to 40% copper matte will require approximately 25% silicious ore, while blister copper will require about 30%.

The east side belt is characterized by the situation of the ore deposits in a mineralized zone, striking northeast and lying within a belt of rhyolite—the Bully Hill rhyolite. The rhyolite contains intrusions of a diabasic rock, and is sheared to considerable extent. The Bully Hill group and adjoining properties lie on the north branch of the rhyolite belt, with the Afterthought mine on the southern extension. Near the bend, where the belt crosses the Pit river, copper ore deposits have been found. In this section the copper is not restricted to the rhyolite, as is the case on the west side, deposits frequently occurring in the Dekkas andesite. In the Bully Hill mine the east or hanging wall is formed of the diabase intrusion.

The ores of the Bully Hill district are richer in gold than the veins of the west side, and contain a large percentage of zinc blende. The copper is also of much higher grade and the secondary enrichment superior to the properties located on the Balaklala rhyolite. The veins are very persistent, the ore bodies of the Bully Hill having been developed to a depth exceeding 900 ft.

The principal properties of the west side belt are the Mammoth, Balaklala, Iron Mountain, Hornet and Trinity groups. During the past year the Mammoth and Iron Mountain properties were the only producers on the west side, their total production approximating 26,000,000 lbs. of copper for 1907. The foremost mine is the Mammoth owned and operated by the Mammoth Copper Mining Co., a subsidiary corporation of the Smelting, Refining & Mining Co.

The ore bodies in the Mammoth are of immense size and run about 3.6% cop-

*Leading properties of the belt are located on west side of Sacramento river. East side noted for its rich deposits of copper and precious metals.*

*Principal properties Mammoth, Balaklala, Iron Mountain, Hornet, Trinity, Bully Hill and Afterthought.*

per, with fair values in the precious metals. The lode is removed in slices and timbering installed. The ore is entirely extracted and the roof permitted to collapse. The ore is transported from the mine to the smelter, a distance of three miles, by a steam-electric-gravity tramway. With the installation of the new tramway the capacity of the haulage system was doubled. The gravity tramway

ter-jacketed, have a tuyere area of 42 by 180 ins. The two new furnaces increase the capacity of the plant about 70%.

The converter plant contains two compressor stands with eight converter shells 96 by 150 ins. in diameter. A Nordberg compressor with a capacity of 1,700 cu. ft. per minute and operated by a 750 hp. motor provides the heavy blast required by the converter. Two electric cranes, each with a main hoist having a capacity of 50 tons, and two auxiliary hoists of 15 tons capacity, will handle the metal and converter shells.

The power house is equipped with three General Electric motors of 150 hp. each and three 200 hp. Westinghouse motors. Two 100 hp. motors and a 750 hp. General Electric motor complete the electrical installation in the main power house. The power house further contains six large Cornersville blowers, with a capacity of 124 cu. ft. of air per revolution. The blowers make 135 revolu-



Balaklala Smelter.

is double-tracked through its entire length, and the cars conveying the ore from the upper to the lower bins will carry 20 tons each.

The smelter plant now embraces five furnaces, including the two recently installed. The new furnaces have a tuyere area of 50 by 180 ins. and are water-jacketed from the bottom to the charge floor. The water jackets are 30 ins. wide and 16 ft. long. Two end jackets extend from the furnace floor to the feed floor.

Each furnace is equipped with a water-jacketed top in place of the brick hood generally in use. These jackets extend from the feed floor to the take-down provided for escaping gas. The smokestack which rises 200 ft. above the concrete foundation, has a diameter of 18 ft. and is self-sustained throughout. The new system of dust chambers are much more extensive than the original installation. The old chamber is used to receive the down-take from the blast furnaces. The old blast furnaces, three wa-

jones per minute and are driven by electric motors receiving a current from the wires of the Northern California Power Co.

The smelter has been placed in an independent position as far as the supply of silicious ores are concerned by the acquisition under a bond of the Quartz Hill mine in the Old Diggings district, near Redding. This property contains the largest deposits of silicious ore yet discovered in Shasta county. The Mammoth Co. constructed a bridge across the Sacramento river and built a narrow-gauge railway line from Kennett to the Quartz Hill mine in order to insure the steady receipt of ore. When all the furnaces are in operation it is estimated that the Mammoth smelter will reduce 1,500 tons of ore daily.

Ranking next to the Mammoth mine in point of production is the Mountain Copper Co. Ltd., operating the Iron Mountain and Hornet mines and Mountain Copper smelter at Keswick. Most of the ore treated during the past year

came from the Iron Mountain property, while development work on a large scale was carried on in the Hornet mine, resulting in the development of an enormous reserve of ore. The Iron Mountain mine has been on fire for several years, and the attending gases and heat have made underground conditions extremely bad. Spontaneous combustion caused by the contact of fine pyrite dust with decaying timbers, in a close atmos-

blocks of ore. Actual development at the Balaklala mine has been confined to a few claims and further exploration is expected to demonstrate the presence of other large ore bodies. The ore will be extracted in slices, the same as has been done in the Mammoth and Iron Mountain mines. The Balaklala mine holdings embrace a larger area than any other property on the Shasta belt.

The smelter is located at Coram and

minal of the tramway. The capacity of the compressors at the mine is approximately 3,000 cu. ft. of air per minute.

The Trinity group of mines are located near the Balaklala holdings and have shown well with limited development. The principal mine of the group is the Shasta King, which possesses the general characteristics of the other west side properties. An agreement exists between the Trinity and Balaklala interests where have been constructed at the mine territory by the ore from the Shasta King mine will be treated at the Coram smelter.

The principal properties on the east side are the Bully Hill group at De Lamar and the Afterthought property at Ingot. Unlike the practice in vogue on the west side, where the ore is developed by driving tunnels into the Mammoth veins, the deposits on the east side are worked by shafts. The ores in this section are of much higher grade than that occurring in the Balaklala rhyolite, which overcomes the increased operating expense.

The Bully Hill and Rising Star mines are the principal properties of the Bully Hill holdings. The Winthrop mine at Copper City, a few miles from Bully Hill, is another important property of the Bully Hill Co. The Bully Hill deposits have been developed to a depth of 900 ft. by a large working tunnel and a 3-compartment shaft. The shaft is equipped with a double drum electric hoist with a capacity of 1,000 tons of ore per day at great depth. The comparatively narrow veins of copper carry a good percentage of gold and silver, the precious metals in many instances defraying the cost of mining and reduction. The Rising Star shaft is also 3-compartment and has attained an approximate depth of 800 ft. The deepest workings of the Bully Hill are at a depth of 970 ft. During the



Bully Hill Smelter.

phere, is regarded as the cause of the constantly occurring outbreaks of fire in this property. The ore is extracted in horizontal slices, a sub-division being made on each slice so that the two end stopes are separated by a central pillar, preventing the spread of the flames. Tunnels are driven through the country rock and across the ore body to the further side. From this adit drifts are driven at regular intervals. The rock breaks easily, in many cases blasting being unnecessary. The heat in many of the levels is intense and the working of the property is attended with considerable danger. There is no hoisting or pumping, which offsets many of the disadvantages under which the property labors. Despite all obstacles, the operation of the Iron Mountain has been attended with large profits. The mine is the richest and most extensively developed in the district and has paid many dividends. Owing to an injunction, the Mountain Copper people were practically compelled to close their Keswick smelter for a long term of years, the output of the mines being handled at their Martinez plant at tidewater. Recently, however, several improvements have been made to the smelter and it has been modernized throughout.

The Balaklala mines and smelter are the largest on the Shasta copper belt, the mine having been developed by a series of tunnels and drifts with a large tonnage in sight. The Weil is the main working tunnel and has been driven in a southerly direction into the mountain until the ore bodies demonstrated by diamond drilling were intersected. As far as the tunnel has progressed the ore bodies are strong and persistent. Drifts have been extended from the tunnel at regular intervals and have developed large

contains three water-jacketed blast furnaces 56 by 240 ins. in the tyres, and a reverberatory furnace, 17 by 95 ft dimensions, interior measurement. Fuel oil will be used in the reverberatory furnace, which is expected to handle 200 tons of charge every 24 hours. The reverberatory furnace was designed to reduce the "fines" from the blast furnace charge, thereby admitting of a readier permeation of the blast. MacDonnell furnaces for



Mammoth Smelter.

calcining the fines form an important part of the equipment. The stack is 20 ft. in diameter and 250 ft. high. Electricity will be extensively used to furnish motive power.

An aerial tramway extends from the mine to the smelter, and large ore bins

past year the Bully Hill Co. has prosecuted extensive development on the main group and the Winthrop property with the result that an immense reserve of excellent grade ore has been developed. The completion of the Sacramento Valley & Eastern railway from De Lamar

to the station of Pit on the Southern Pacific main line brought the region in close touch with outside markets.

The smelting plant comprises two water-jacketed blast furnaces with air-jacketed tops. The furnaces are 42 by 200 ins. in dimensions at the myeres and will treat from 350 to 400 tons of ore per day. The reverberatory furnace is designed to handle 75 tons per day. Hot blast is used in the blast furnaces. The hot gases from the reverberatory furnace will develop sufficient heat for the blast, but the hot-blast stove has been designed to use fuel oil in case of an emergency. To this end especially designed burners for the protection of the U-pipe stands have been provided. The hot-blast stove contains 72 U-pipe stands. The pipes have a diameter of 15 ins. and are 12 ft. from U to U. A new stack, 12 ft. in diameter and 175 ft. high, has been constructed in addition to those already erected. The old plant contained two furnaces, a battery of McDougall roasting furnaces and a converting plant

on the Shasta Copper belt yield 3.0% copper and \$3.10 in gold and silver per ton. Pyrite smelting is applied practically exclusively to the treatment of the ores with successful results. On the east side of the belt the hot blast has generally come into universal favor, this method being most successful in treating the ores encountered in that section. Operating costs vary so widely that it is practically impossible to give anything like an accurate estimate of the average mining and smelting costs. In most of the properties the precious metal values defy the entire production costs. Labor is generally paid \$2.75 per day. Living expenses are moderate and the general condition of labor is excellent.

The first modern smelter in Shasta county was erected by the Mountain Copper Co. at Keswick in 1907. The importance of California as a copper producing state dates from that year, when 13,678,626 lbs. of copper were produced. The output of the Mountain Copper properties steadily increased until 1904, when

lack of transportation facilities or distance from centers of consumption. These deposits are now becoming of steadily increasing importance.

One such deposit, in Iron county, southern Utah, in what is known as the Iron Springs district, is described in a bulletin (No. 338) by C. K. Leith and E. C. Harder, just published by the United States Geological Survey. This region has been explored by about 1,600 pits, but as the deepest pit was carried down only 130 ft. the vertical extent of the ores is not known. Their total area is 5,430,000 sq. ft. and their total tonnage, so far as can be measured by the areas and pits explored, is 40,000,000 tons. Probably this estimate is much too small, as the ores doubtless continue for some distance below the depths indicated by the deepest pits. The nearest railroad station is 22 miles distant.

The Iron Springs district was selected for examination because the deposits are large and well located for study, and the ores are typical of many others in the west, and are of such quality that their commercial development seems likely within a short time.

The ores occur in disconnected masses within a general area that is 1½ by 20 miles in extent, most of them at or near the contact of the country rock with certain igneous rocks known as andesites. These were long ago forced up from the earth's interior against or partly into a great bed of limestone. The force was not great enough to break through the limestone, however, and the molten rock spread out, prying its way between the limestone and the underlying bed and forming what are known to geologists as laccoliths or sills. The force and heat of the intrusion and the later shrinkage, consequent on cooling, fractured and fissured both the andesite and the limestone. Hot ore-bearing solutions rose through the fissures, filling them with iron ores and other minerals, which were deposited as fissure veins in the andesite and as replacement bodies and fissure veins in the overlying limestone. Finally erosion wore away the rock cover and exposed the laccoliths and the ores.

In the opinion of the authors the ores in the andesite may extend downward to very considerable depths, the exact distance being determined by the depth of the fissures in which they were deposited. The depth of the replacement deposits in the limestone depends on the depths to which the andesite-limestone contacts extend. The only one of the laccoliths whose thickness can even be estimated with present information probably does not extend farther down than 2,500 ft.

The uniform association of ore with laccoliths in this and many other western iron districts outlines the first rule for the prospector who is searching for such ores—to find the laccoliths and determine their boundaries. This is easily done, for the laccoliths are harder than the other rocks of the region and stand out above them conspicuously. The contact with the sedimentary rocks should be carefully explored. In places the ores stand out in great black ridges, but elsewhere they are concealed beneath the debris that has slid down the mountain sides.



Mammoth Mine.

of ample capacity to convert the production of the furnaces into blister copper. No change has been made in the converting plant, with the exception of the addition of a number of new shells, as the capacity of this department is ample.

Ranking third among the producers of the Shasta copper belt is the Aftersight mine, near Ingot, operated by the Great Western Co. This property has been developed by a series of crosscuts and drifts, together with a shaft which has been sunk to a depth of about 100 ft. The presence of large quantities of zinc has caused considerable difficulty in the reduction of ore, but the introduction of the hot blast method has made the zincy ores treatable.

The plant is a small one with one furnace in commission. The matte is shipped to Utah plants for conversion. Owing to the heavy cost of hauling freight and supplies, the company has decided to construct a railway line from Ingot to Bella Vista. The completion of the road will enable the company to transport ore and supplies at a fraction of the present cost.

The general average of the ores mined

the production totaled 34,931,788 lbs., the banner year on the belt. Agitation against smelting and the granting of smoke injunctions, together with labor disturbances, then commenced to cut down the yield, and in 1905 the production had fallen to 16,997,499 lbs. About this time the Mammoth Copper Co. became actively interested and in 1907 the production increased to 28,726,148 lbs. With a small exception, practically the total yield came from Shasta county producers.

### The Iron Ores of Utah.

The rapidly increasing consumption of iron ore in the United States during the last few years has led to careful investigation of all available supplies, both in producing districts and in relatively unknown fields, with the result of emphasizing the limitation of the deposits now worked and of pointing out the need for the early exploitation of new ones. At present less than 2% of the iron ore mined annually comes from the region west of the Mississippi, where large deposits have not been worked because of

## Constructing a Placer Ditch.

BY DENNIS H. STOWELL.

In the construction of a placer ditch care must be taken that the bottom velocity of the flow, after the water is turned into the channel, is not so great as to wear away the soil. If there is any such danger, artificial means must be applied to protect the channel-way, or it may be advisable to reduce the rate of fall and increase the cross-section of the channel. It is better to give the ditch a minimum grade and maximum width than a reverse of these conditions. A good width not only insures against heavy bottom velocity, but allows ample margin for the growth of plants on the ditch border, and the deposits of mud and debris. Of course, if a ditch is cleaned out regularly, the latter two mentioned obstructions will not have much effect.

It is generally held that the resistances to the flow of water in a channel are directly proportional to the area of the bed surface with which the water comes in contact; and to the square of the velocity of the flowing water; and, inasmuch as the resistance at any given point in the cross-section appears to be inversely as the distance of that point from the bottom or sides, it therefore appears that the total resistances are inversely as the area of the cross-section; because the greater that area, the greater would be the mean distance of all the particles from the bottom and sides. Hence the resistance is independent of the pressure.

In channels of uniform cross-section the maximum velocity is found about midway between the two banks, and generally at some distance below the surface. This distance varies, but, as an average, it seems to be about one-third of the total depth. Where the depth is great in proportion to the width, say, one-half the width or more, the maximum velocity has been found as deep as midway between the surface and bottom; while in shallow channels it approaches the surface to within one to two-tenths of the total depth.

Besides the bottom wear of ditches which causes annoyance, there is the still greater one of breaking caused by slides or overflow. It is essential that there be a sufficient number of waste-weirs to discharge the surplus water that accumulates during heavy rains or quick snow thaws. The number and position of these waste-weirs or gates must depend upon the condition of the country through which the ditch leads, as well as upon the climatic conditions of that particular section. But wherever the ditch crosses a gulch or stream, by flume, the waste-weir should discharge its water into the gulch or stream. These are favorable points for the reason that the waste water is immediately taken up and conveyed safely away.

The path or trail for the ditch walker should always be built on the lower side of the channel. Too frequently the construction of this path is slighted. If the ditch is an extra long one, requiring a round trip of 30 or more miles to cover it, the trail should be wide enough to allow the passage of a horse. This is

the plan adopted by many western miners. It is not possible for a horseman to follow the channel or water the whole distance, for the reason that long flumes are used to convey the flow across deep gulches or wide streams, but a man on horseback can cover the ditch much more quickly than a man on foot, even though required to make detours where flumes are encountered. The ditch trail needs to have a firm surface, and so built that the water from it during heavy rains will be conveyed into the ditch itself rather than down the hill; it should, therefore, slope toward the channel.

A convenience that many hydraulic miners are installing on long ditch lines is the telephone. Stations with boxes are arranged at intervals of a mile. In case the walker discovers a breach in a bank, or needs assistance of any sort, he can call up the superintendent or foreman at the mine, and have help on the ground in a little while. Bad ditch breaks, entailing considerable loss of property and time, have been prevented by the telephone.

The preservation of the banks at the water line, particularly on the lower or downhill side, is a matter of importance. "Pitching" with stones, and "facing" with brushwork are employed. The latter method is cheaper and more convenient in most cases, and proves not only an economical, but an effectual protection.

## Geological Survey Work in Alaska.

The United States Geological Survey has just issued its fourth annual volume on the mineral resources of Alaska, giving the results of investigations made during the year 1907. These volumes, which have been prepared under the supervision of A. H. Brooks, geologist in charge, are designed not only to make public the more important economic developments in Alaska, but also to record the advance of mining and to form handy works of reference, by which reliable information may be promptly supplied to the pioneer prospector, the publication of elaborate reports and maps being deferred until more complete information can be obtained.

The papers included in the present bulletin (No. 345) fall into three classes: (1) summary of the progress of mining in various parts of the Territory; (2) preliminary accounts of investigations under way or completed; (3) statement of the results of minor investigations which will not be published elsewhere.

The year 1907 witnessed a marked advance in mining in Alaska, despite the fact that the value of the production decreased \$2,503,237 as compared with 1906. Nearly all of this decrease was in the output of gold, and is ascribed to labor difficulties at Nome and Fairbanks and to the diversion of labor to work that is not immediately productive—the installation of large mining plants, which are expected later to yield correspondingly large returns. The fall in the price of copper also contributed to the total decrease in production. As it was, however, the preliminary estimates show that Alaska produced \$19,600,000 in gold, \$1,040,000 in copper, and \$231,771 in other minerals.

The Survey has been much hampered

in its statistical work by the failure of some of the large mining companies to answer statistical questions sent to them by mail. Out of 15,000 such queries sent annually to the gold miners in the states proper, more than 97% are answered promptly; in Alaska, on the other hand, only about 40% of such inquiries sent to the placer miners are answered. This makes the collection of placer statistics very difficult. This criticism applies to placers only, for nearly all the operators working on copper and quartz lodes, coal mines, building material, etc., have cooperated fully with the Survey. It may be added that all information sent in is treated as strictly confidential.

The work of 1907 covered a wide field. As all important districts in southeastern Alaska had been studied in previous years, work in that section was confined chiefly to detailed topographic and geologic mapping. About 64½ square miles were mapped. C. W. Wright, of the Survey, spent about three months in detailed geologic work; and from this and his previous work in the same region he has prepared a description of lode mining in southeastern Alaska which forms part of the bulletin.

The Kotsina and Chitina valleys in the Copper River region were further studied in 1907 and an account of their mineral resources, particularly copper, by F. H. Moffit and A. G. Maddren, forms part of the present report. The complete report will probably be issued next January.

Systematic surveys in the Yukon basin were continued and form the subject of several papers, among which L. M. Prindle's report on the distribution and source of the gold and C. C. Cover's report on the water resources of the Fairbanks district may be specially noted. A detailed topographic map of the Fairbanks district (scale 1 mile to 1 in.) was completed in 1907 and has been issued by the Geological Survey.

The geologic complexity of Seward peninsula calls for considerable detail work. The mineral deposits are described by P. S. Smith and Adolph Knopf, and the water resources by F. F. Henshaw.

The most important feature of this publication is a more comprehensive treatment of the distribution of the mineral resources throughout the territory than has been previously attempted. A brief resume of the occurrence of the metalliferous deposits, mineral fuels, and building material is presented, and their known distribution is indicated on a map that accompanies the volume. This map, which is on a scale of 80 miles to the inch, is compiled from the latest data and represents the first attempt to indicate cartographically the distribution of the mineral wealth. It is supplemented by other maps which represent in greater detail some of the most important mining districts, including southeastern Alaska, the Copper River region, the Yukon-Tanana region, and Seward peninsula.

Lead, mainly for tea packing purposes, was imported into Ceylon to the amount of 2,738,176 lbs, principally from Australia, during the first quarter this year.

# Development of Nova Scotia's Mineral Resources.

By ARTHUR S. BARNSTEAD.\*

The foundation of the recent development of Nova Scotian industries has been the mineral wealth which it possesses. The province is undoubtedly endowed with mineral wealth to an extraordinary degree. The government owns all the mines, but does no mining, this being left to the private initiative of enterprising capitalists who can obtain leases of coal, gold and other mineral deposits. The government does everything to encourage responsible parties who seriously undertake to do scientific exploration. The field is open to all foreign investors, it being a statute law that anyone may take out a lease on agreeing to pay the stipulated royalty to the government.

The rental or royalty payable to the Crown is very small. In the case of coal it is ten cents a ton. One company, the Dominion Coal Co., which obtained a 99 years' lease, pays 12½ cents per ton. The royalty on gold is 2% on the gross value, that is, 36 cents per ounce for unsmelted gold, and 38 cents per ounce for smelted gold. The legal royalty on iron, in the iron ore beds which the government has reserved, is five cents per ton. In the case of minerals other than gold, such as coal and iron, licenses to search cost \$30 for an area of 5 sq. miles. Licenses to search for gold cost 50 cents, and leases \$2 per acre of 250 ft. by 150 ft. The governmental charges are extremely moderate.

## COAL.

The coal fields of Nova Scotia are all on the sea-board. The supply is practically inexhaustible. As an instance of this, the Dominion Coal Co. at Glace Bay have—to its certain knowledge—sufficient coal in their holdings to provide for an output of 3,500,000 tons per year for hundreds of years. Every other company operating in Nova Scotia would probably have, in proportion to their present output, an equally long life. While the coal mining industry has assumed something like large proportions, it can only be said to be as yet in its infant stage. The natural increase in the demand of the country amounts of itself to 12% per annum.

The following summary of Nova Scotia coal sales from 1785 to 1907, inclusive, will indicate the remarkable development of the industry within recent years:

	Tons.
1785 to 1790.....	14,340
1791 to 1800.....	51,148
1801 to 1810.....	70,452
1811 to 1820.....	91,527
1821 to 1830.....	140,820
1831 to 1840.....	339,654
1841 to 1850.....	1,532,708
1851 to 1860.....	2,398,519
1861 to 1871.....	5,927,538
1872 to 1880.....	2,374,430
1881 to 1890.....	12,590,126
1891 to 1900.....	21,552,526
1901 to 1907.....	30,654,670

Coal is found in deposits in the countries of Cape Breton, Pictou, Cumberland and Inverness, and also to a lesser de-

*The Government owns all the mines, but does no mining, leases being easily obtained, scientific exploration encouraged. Field open to all foreign investors.*

*Gold, coal, iron and gypsum principal products.*

gree in the counties of Richmond, Victoria, Colchester and Antigonish.

## GOLD MINING.

The discovery of gold in Nova Scotia was purely accidental, like, indeed, most of the modern discoveries of this metal. One-half of the total area of Nova Scotia is in gold-bearing rock. It was first found at Tangier, 60 miles east of Halifax, in March, 1861. Other discoveries at the Ovens at Lunenburg, at Indian Harbor and Wine Harbor in Guysboro counties, followed, and Nova Scotia became one of the gold countries of the world. In 1868, 27,000 ozs. were produced from the smelters. The average yield yearly, since, has been about 20,000 ozs. The largest yield for any one year, of which returns have been made, was 31,104 ozs., amounting in value in round numbers to \$900,000. The records show that up to Sept. 30, 1907, out of 1,910,156 tons of rock crushed, 886,236 ozs. of gold were produced.

While gold mining has been prosecuted for the past 45 years with greater or less vigor and with considerable success, in proportion to the outlay of labor and capital, the exploitation of this great source of wealth has been largely retarded by want of proper scientific investigation and of modern methods of mining. As long as the surface croppings could be harvested, the industry could be prosecuted with more or less profit by the expenditure of limited capital. So far, however, modern methods are being introduced but slowly, and deeper mining is only in its initial stages. The only two companies that have made serious attempts at comparative deep mining are the Brookfield Mining Co., operating at North Brookfield, Queens county, and the Baltimore Nova Scotia Mining Co., at Caribou, Halifax county—both of these mines have reached a depth slightly in excess of 1,000 ft. vertical.

The time has come when profitable gold mining is a proposition that can be taken bold of only by those with large capital at their command. The initial attempts of deeper mining have abundantly proven that there are rich returns for the large investor. The time seems ripe for development along modern lines for the mining of gold in Nova Scotia similar to that which has taken place within the last 15 years in the history of coal.

## IRON AND STEEL.

Iron is found in large quantities in

many parts of the province, but owing to the proximity of the enormous deposits in Newfoundland which are so favorably situated for easy and cheap mining, the production of iron ore in Nova Scotia has not yet received the attention which its importance warrants,—in every county of the province, without a single exception, deposits of iron ore have been discovered.

Sir William Fairbairn, in writing upon the Nova Scotia iron ores, says: "In Nova Scotia some of the richest ores yet discovered occur in boundless abundance," and Sir William Dawson, in referring generally to the distance of the iron ore from the fuel required in so great a quantity whenever smelting processes are undertaken on a large scale in Canada, says: "It should, however, be borne in mind that the great iron ore deposits of Nova Scotia, equal in extent and value to any others in the Dominion, lie in close proximity to some of the greatest coal fields in the world. Even in Great Britain itself the two greatest staples of mineral wealth are not in more favorable contiguity, and the iron ores of Great Britain are neither so rich nor so accessible as those of Nova Scotia."

With these vast and rich deposits of iron ore at hand, and with coal and limestone in close proximity, great facilities exist for the manufacture of iron and steel in the province, and this is already demonstrated by the rapid development of the great iron and steel plants at Sydney and at New Glasgow and Sydney mines.

One result of the growth of the Dominion Iron & Steel Co. has been that the town of Sydney, whose population a few years ago was between two and three thousand, has increased to the size of a city of about 13,000 or 14,000 people.

## OTHER ORES.

The gypsum deposits of Nova Scotia are among the largest in the world, though it is still an infant industry. So excellent is the quality of the gypsum that the exportation has risen in only a few years from a few hundred tons to 300,000 tons annually.

Copper ores are quite widely spread. During the last two or three years serious attempts have been initiated to develop some of the more promising of these properties, and with highly satisfactory results. But nothing has yet been done on anything like the big scale that the large deposits would warrant.

Limestone, which sometimes occurs as a marble, has not, to any great extent, been used for building purposes, owing to the splendid quarries of granite prevailing. But its excellence as a flux is now well understood and Nova Scotia produces all the limestone required by the steel companies, and enough remains to supply the demand of all the markets in the world.

Antimony occurs in several parts, and is generally associated with high percentages of gold and silver. There is one

\*Secretary Department Industries and Immigration.

large mine now in operation, which is making most satisfactory returns to its shareholders.

The ore of lead most frequently met with here is galena, generally carrying silver, which is said to be present sometimes in amounts running up to 100 ozs. to the ton of lead. It occurs in rocks of all ages, but most abundantly in the lower carboniferous limestones, which are found in almost every county.

There is abundance of building stone and grindstone. Enormous beds of freestone occur in several counties of the province, furnishing a beautiful material for buildings, as well as for grindstone purposes. Gray granite, red granite, red freestone, and blue limestone are in great abundance, and all most suitable and pleasing in appearance for structural work.

Clay suitable for building brick occurs in many parts, and numerous large industries have already been established for the manufacture of brick. Fire clay, suitable for the manufacture of fire brick, is also found widely distributed, being associated with the coal all over the province.

Salt, in the form of brine springs, is almost as widely distributed as the coal, with which it seems to be in some way associated.

Two large firms are engaged in producing barytes, which finds a ready sale.

In fact, there is hardly a mineral known to the scientific world that is not found in this richly dowered little province.

### Rangely Oil Field, Colo.

The prospective development of an oil field in what is known as Raven Park, in the extreme northwestern part of Rio Blanco county, Colo., has aroused considerable interest in this district, which until seven or eight years ago, when oil was discovered there, had offered few inducements to exploitation. The region was first called Raven Park by C. A. White, who as a geologist of the Hayden survey visited it in 1875, but as an oil field it is now more generally known as the Rangely Basin, from the postoffice there. The basin is irregularly oval in outline, and occupies a broadened portion of the lower valley of White river, which enters it in a canyon at its southeastern extremity, flows along the southern margin and leaves by another canyon, through which it flows for the remainder of its course in Colorado. Raven Park lies for the most part, therefore, north of the river valley. The oil field may be reached from Dragon, Utah, 33 miles away, by a day's journey, but the trip must be made by private conveyance, as there is no regular means of transportation.

The world's production of zinc spelter in 1907 was 813,842 short tons against 775,871 tons in 1906. The United States was the only country with a large increase, having advanced from 221,770 tons to 249,842 tons. Belgium produced in 1907 170,307 tons, and Silesia 152,011 tons, both slight increases.

Magnesite exports from Greece in 1907 were 36,520 tons, as against 32,134 tons in 1906.

### Production of Lead in 1907.

BY C. E. SIEBENTHAL\*

The product of refined lead can not be apportioned according to sources of ore from which it was derived, owing to the fact that lead refiners treat products which are secondary and are derived from diverse sources. The identity of ore, and thus its original source, is preserved only as far as the smelter. Accordingly, the following table showing sources of lead produced in the United States is based on smelter figures. It includes "pig lead" reported by all known smelters running on Mississippi Valley lead ores, and "lead" produced at all other known lead smelters in this country. No lead ores from the United States were treated elsewhere in 1907.

#### SOURCES OF LEAD PRODUCED IN THE UNITED STATES.

United States—	1906.	1907.
Alabama.....	8	0
Arizona.....	2,581	2,340
Arkansas.....	15	15
California.....	432	854
Colorado.....	50,497	48,876
Illinois.....	7	7
Idaho.....	117,117	112,569
Indiana.....	572	498
Iowa.....	270	225
Kansas.....	1,932	1,798
Kentucky.....	44	75
Missouri.....	11,075	122,856
Montana.....	2,485	2,035
Nevada.....	1,669	3,380
New Mexico.....	6,440	1,957
Oklahoma.....	.....	404
Tennessee.....	11	16
Texas.....	19	19
Utah.....	56,260	61,829
Virginia.....	.....	82
Washington.....	46	281
Wisconsin.....	1,732	3,551
Total from domestic ores.....	317,695	363,193
Foreign—		
Africa.....	.....	123
British Columbia.....	7,238	5,293
Central America.....	112	0
China.....	18	0
Mexico.....	18,839	69,247
South America.....	.....	911
Other foreign.....	.....	149
Total from foreign ores.....	556,207	67,423
Other sources—		
Zinc residues.....	2,053	1,218
Undistributed.....	9405	355
Total miscellaneous.....	2,458	1,623
Grand totals derived from all sources.....	496,349	532,589

\* Excludes of 12,339 tons lead derived from Mexican bullion.

\* Excludes of 9,425 tons of lead from Mexican and other foreign bullion.

\* Including, according to special reports, 10,000 tons of lead from Texas.

The following statement of the production of refined lead embraces all details.

\* Advance statement, published by permission of U. S. Geol. Surv.

CONSUMPTION OF LEAD IN THE UNITED STATES.			
Supply—	1906.	1907.	
Stock, domestic, beginning of year.....	3,975	4,571	
Stock, foreign, beginning of year.....	56	61	
Total production, refined lead.....	101,665	114,189	
Total production, antimonial lead.....	10,146	8,510	
Imports, foreign refined.....	11,762	5,277	
Total available.....	431,869	438,611	
Withdrawn—			
Stock, domestic, close of year.....	4,571	(*)	
Stock, foreign, in bond, close of year.....	61	41	
Refined in bond from foreign base bullion and ores and exported.....	18,558	15,782	
Lead in manufactures exported under drawback.....	1,516	9,213	
Total withdrawn.....	54,706	17,072	
Apparent consumption of lead.....	376,390	390,938	
Lead available for consumption in the United States.....	.....	390,938	

\* Unknown owing to refusal of one company to furnish information under this head. Undoubtedly much larger than in 1906.

\* Not including a small unknown amount in miscellaneous manufactures.

verized lead produced at works in this country and the pig lead recovered from the Mississippi Valley lead ores. It is exclusive of a product of 9,910 tons of antimonial lead reported by refineries. Of the pig lead derived from Mississippi Valley ores 29,809 tons were desilverized and are therefore included under desilverized lead and not under soft lead. The original sources of the ores affording this refined product are shown in detail in the accompanying table under "Sources." PRODUCTION OF REFINED LEAD IN THE

#### UNITED STATES.

	1906.	1907.
Production of desilverized lead.....	313,885	314,241
Production of soft lead.....	30,785	29,948
Total production of refined lead.....	404,669	414,189

In this table stocks, both domestic and foreign, and production are in terms of refined lead, imports and exports are in finished state, and antimonial lead is in marketable form, while lead in ores and bullion is excluded. The figures for refined and antimonial lead and for domestic stocks are based on returns from the refineries and smelters. All other figures are from statistics compiled by the Bureau of Commerce and Labor. It has not been found possible to obtain accurate returns of domestic stock at close of 1907, hence no figures are given. For this reason the result below given is "lead available for consumption." The "apparent consumption" of previous reports would be this quantity diminished by the domestic stock at close of year.

**Iron Works at Shanghai.**—A company has been formed in Shanghai, China, with a capital of \$20,000,000, with the object of taking over the Haiyang Iron & Steel mines and the Ping Hsing collieries. The new company intends to develop the existing works to the extent that, within the next few years, they will be able to meet the requirements of the government with regard to ammunition, rails and locomotives. One-third of the capital, it is said, has already been subscribed. It is recalled that the Haiyang Iron & Steel Works Co., the most important venture of the kind in China, has already been reconstructed within the last few years, and its present output is estimated at about 60,000 tons of iron ore per annum. Its steel works have only recently been opened.



# The Silberberg Mines in the Bavarian Forest.

By H. B. PULSIFER.\*

The Silberberg is one of the higher peaks among the hills about Bodenmais, not far from the Danube, in Southwestern Bavaria.

Part way up the hill are found the deposits of iron sulphides which have been worked almost continuously for some 800 years. The records show that originally silver-lead ore was found in the neighborhood, and that because of this the name Silberberg was given; although many minerals are found associated the massive iron sulphides alone are of sufficient importance to be worked at present.

Although the mine is so old, the amount of material excavated is relatively small. As the sulphides occur massive, each area is worked out to the boundary of gneiss, leaving rather rounded lenticular chambers of not very large dimensions.

In earlier times the ore was loosened by fire and water, many cleanly rounded

*Deposits of iron sulphides have been worked almost continuously for some 800 years.*

*The material excavated is relatively small. In earlier times ore was loosened by fire and water.*

suitable for the further oxidation in great piles.

When each little heap is cool enough to be handled it is removed to the larger piles, which may be broad and circular, or long, like stacks. A stack may be from 40 to 50 ft. long and 15 or 20 ft. wide. It is now left to itself and the weather for from three to four years.

During this long period of oxidation the mass turns yellow and red, sulphur

by molten material, while the sulphides themselves contain corroded masses of the gneiss and possess a scoriaceous character similar to that of proven eruptive masses.

The chief constituent of the ore is



Primitive Wooden Pendulum Pump in Silberberg Mine.

cavities now exist in the gneiss showing where was once a solid mass of sulphide. Even now only hand drilling is practiced, and one sees queer tools for gouging the more or less shattered material. Timbering is not required except in the drifts and approaches.

For a long time the ore has been used chiefly as raw material for polishing rouge. The product is known as "Potée"; has a world-wide market and excellent reputation.

After being carried out of the tunnels or inclined shafts, none of which penetrate very deeply, the ore is piled over a bedding of wood. The larger chunks are laid first, and last of all the fines heaped on as a covering. The wood being ignited, the whole heap smoulders for two days until thoroughly hot in all parts; water is then dashed on, whereby it all crackles and attains a porous condition

escapes as vapor and as dioxide, a portion becomes sulphate.

This process ended, the material is sent to the works where it is given a 4-hour roast in a furnace and further treated to leaching and grinding until it becomes the rouge of commerce. Some sulphuric acid and a little copper vitriol is recovered as byproduct.

As an industrial enterprise it impresses one more for its simplicity and longevity than any other reason.

Greater interest attaches to it as an ore deposit. The local scientists have studied it minutely. Probably the latest and best confirmed theory of its origin is that the masses of sulphide were injected bodily into the gneiss.

The whole region abounds in granite and gneiss and the crystalline schists. Locally, granite occurs close by, but is sharply separated from the gneiss in which all the ore masses are found. The effect on the country rock is as would be produced



Pile of Weathered Ore.

pyrrhotite; pyrite is about equally abundant. Besides numerous rock minerals, the following occur in small amounts: Chal-



Disintegrating the Ore.

\*Mining Engineer, Kansas City, Mo.



coprite, marcasite, sphalerite, galena, cassiterite, magnetite and ilmenite.

In the accompanying illustrations are shown the primitive wooden pendulum pump in the mine; the method of disintegrating the ore (in foreground burned and drenched heap; behind, heap ready to be ignited); and a pile of weathered ore, a portion of which has already been loosened and sent to mill.

### Slime Washing Problem.

The problem of washing slime or sand residues is vexatious, and various appliances have been experimented with. In the *Journal of Chemical, Metallurgical & Mining Society of South Africa* for May, Geo. O. Smart describes an appliance which is given satisfactory results at the Simmer & Jack on the Rand. The device is made from a piece of 8-in. pipe, 9 ins. long, with a flange screwed on each end. The bottom end has a ¼-in. iron plate bolted on, through which a number of ¼-in. holes are drilled. Between this plate and the flange a piece of ¼-in. mesh iron screening and a filter cloth are inserted to form a filter bed. The top cover consists of a round piece of ¼-in. plate similar to the bottom cover, but in this case the bolt holes in both flange and cover are slotted out, so that the bolts can be removed by loosening the nuts and the cover removed and replaced quickly. A ½-in. pipe is screwed into the cylinder immediately under the top flange and connected to an air main. The sample to be washed—sand or slime—is dumped into the cylinder and clear water added until nearly full; when the whole has been mixed up by hand the top cover is put on and the air valve opened slowly. The air entering at the top drives the liquid through the bottom filter, and after about three minutes the cylinder can be opened, when, if a slime sample has been operated upon, a cake containing about 15% moisture will be left on the filter cloth. This is again mixed up with clear water and the operation repeated, after which the sample is removed and sent to be assayed. Two washings have been found quite sufficient, and assays of the second wash filtrate only gave traces of gold. Cyanide managers will appreciate the advantage of getting a slime or sand residue washed in a few minutes instead of having to go through the tedious method of diluting with water, settling and decanting the liquid a number of times. If no air main is available an ordinary bicycle foot pump will supply the air pressure required.

Scientific instruments are in increased demand in Japan. During January and February the imports represented a value of over \$375,000, as compared with less than \$250,000 in the corresponding period of last year and rather more than \$250,000 during the first two months of 1906.

There were 129,496 native laborers employed on the Rand at the end of May, while the number of Chinese was 21,967.

Only 32,560 long tons of graphite were exported from Ceylon last year, which compares with 35,092 tons for 1906.

### Iron Ore Production in United States.

BY EDWIN C. ECKEL.\*

The iron ore produced in the United States in 1907 amounted to 51,720,619 long tons, valued at \$131,296,147 at the mines. As compared with the production of 1906, the most productive previous year, this was an increase of 8.32% in tonnage and of 31.21% in value.

Iron ore is mined for blast furnace use in only 29 states of the Union, though it occurs in almost every state and territory, and by far the greater part of the ore is mined directly by pig-iron producers for use in their own furnaces. The valuation which is placed on the ore is therefore entirely a matter of accounting. Some of the reports made to the survey evidently include merely actual mining cost, others contain an allowance for a sinking fund, and in still others the figures given are obviously merely convenient prices to use in charging costs against the blast furnaces. The errors that result from these various methods, however, are almost entirely in one direction—that of undervaluing the ore. If all of the iron ore were to be bought by iron furnaces in open market from an entirely distinct set of iron-ore miners, the average prices paid would probably be considerably in excess of those reported. In 1907 these prices ranged, for brown ore, from an average of \$1.01 per long ton in Arkansas and Texas to \$3.07 in Connecticut and Massachusetts, and for red hematite from \$1.06 in Kentucky, Maryland and West Virginia to \$3.24 in Wisconsin.

Reports of production in 1907 were received by the survey from 169 mines, the maximum production of any one mine being 2,900,624 tons, from the Hull-Rust mine in Minnesota. Ten mines, all except one being located in Minnesota, produced over 1,000,000 tons each. The million-ton mine not located in Minnesota was the Red Mountain of Alabama, which during 1907 produced 1,370,819 tons and ranks seventh in the list of producing mines.

The producing states are grouped into four natural districts, defined by geographic and trade considerations. These are (1) the Lake Superior district, which in 1907 produced 80.51% of the total ore mined, and which includes Michigan, Minnesota and Wisconsin; (2) the southern district, which produced 12.42% of the total ore, and which includes Alabama, Georgia, North Carolina, Tennessee, the Virginias, Maryland, Kentucky, Arkansas, Missouri and Texas; (3) the northern district, including New England, New York, New Jersey, Pennsylvania, Ohio and Iowa, producing 5.16% of the total; and (4) the western district, producing 1.61% of the total ore, and including the states of Colorado, Utah, Wyoming, New Mexico, California, Washington and Montana.

The stock of ore at the mines on December 31, 1907, amounted to 3,033,110 long tons, as compared with 3,281,789 tons similarly held on December 31, 1906, and 3,812,281 tons on December 31, 1905. The detailed figures, however, show that

\*Extract from *Mineral Resources of the U. S.*

while the stock on hand at the mines on December 31, 1907, was about 250,000 tons less than on the same date in 1906, the stock on hand at the lower lake ports indicated an increase of over 1,130,000 tons.

During 1907 the United States imported more than 1,200,000 long tons of iron ore. Of this total over half was from Cuba and about a third from Spain. About 116,000 tons came from British North America, and the remainder was from numerous smaller sources of supply. The exports during the year amounted to 278,208 long tons, a slight increase over the exports of 1906. The bulk of these exports represent Lake Superior ores shipped directly from the American side to Canadian furnaces.

The data on iron-ore production which form the basis of this report are collected directly by the United States Geological Survey, requests for statistics being sent to every producing mine in the country. The data on the pig-iron and steel industries, presented in connection with those of the iron-ore industry, are collected by the American Iron and Steel Association and published through the courtesy of that association and of its general manager, James M. Swank. According to Mr. Swank, the production of pig iron in the United States in 1907 amounted to 25,781,361 long tons, as compared with an output of 25,307,191 tons in 1906 and of 22,992,380 tons in 1905. The small increase shown by 1907 over 1906 is due to the falling off in demand and production during the last quarter of the year. If the output of the first half of the year had been maintained, 1907 would have shown a total production of about 27,000,000 tons.

The production of Bessemer steel ingots and castings in 1907 was 11,607,549 long tons, against 12,275,830 tons in 1906, a decrease of 608,281 tons. The total production of open-hearth steel ingots and direct castings in the United States in 1907 was 11,519,088 long tons, against 10,980,413 tons in 1906, an increase of 538,675 long tons, or over 5.1%.

*Petroleum Output of Canada.*—According to the preliminary report just issued by the Canadian government, the petroleum output of Canada in 1907 was 788,872 barrels, valued at \$1,057,088. The natural gas production for the year was valued at \$863,908. It is also stated that the number of petroleum producing companies in Canada is about 300 and natural gas companies 15. The new oil and gas fields near Tilbury are producing now more oil from about 250 wells than the old petroleum field with its 6,500 wells. Judging from the report of Mr. Cirkel, this Tilbury field will likely extend toward the south as far as Lake Erie. It is, therefore, very probable that new wells will be established, thus adding considerably to the present production.

Florida phosphate shipments in May were: Punta Gorda, 92,752 tons; land pelbble and 9,122 tons hard rock; Savannah, 9,917 tons hard rock; Fernandina, 14,660 tons hard rock and 3,201 tons land pelbble; Port Inglis, 21,494 tons hard rock; total, 151,146 tons.

# Ontonagon County Mines, Past and Present.

By ROBERT H. MAUERER.

The increased activities in Ontonagon county, Mich., are traceable directly to the remarkable find made by the Lake Copper Co., nearly two years ago, of the now justly famous "Lake" lode, on lands acquired of the old Belt Mines Co., Ltd., an English company, that has since gone down into history as a failure of the veriest kind. The Belt Mines Co., by sheer bad management, contrived to sink over \$1,250,000 in the three years following its organization, in 1882, without securing as much as one-half mile of underground openings. A considerable part of the expenditures went into a very complete surface equipment, including a narrow-gauge railway, with necessary rolling stock, a great part of which may yet be seen scattered about the landscape, nearly 25 years after its abandonment.

The Lake Copper Co., organized in 1905, to take over a part of the old Belt's lands, has already accomplished wonders in the resurrection of this property. Old buildings have been repaired and an entirely new mine has been opened to a depth of 300 ft., with about 300 ft. of lateral workings. The company is now taking out copper rock equalled in richness by few, if any, of the richest mines in the entire district. Further diamond drill explorations to disclose other copper-bearing lodes believed to traverse the property are contemplated, and may begin before the end of the present year.

Mining operations in this end of the Lake Superior district, of which any record is had, began many years before the more successful mines to the north were opened, and antedate the American Revolutionary War by several years. The first attempt at copper mining in historic times was made on property now embraced in the lands of the Victoria Copper Mining Co., in the winter of 1770-1771, and resulted in utter failure. The next work was done nearly 80 years later, when, in 1849, the property was reopened on a line of prehistoric pits.

The new company was energetic and operated the property regularly on a small scale. Success, however, did not attend its efforts and after losing one stamp mill by fire and a second by a flood, the company gave up to the inevitable in 1855. Thereafter the mine was worked spasmodically and was practically idle until 1899, when the Victoria Copper Mining Co., the present corporation, was organized. Up to that time the various attempts at mining resulted in a production of less than 200 tons of fine copper, at a loss of nearly \$200,000. The present organization is operating steadily and producing at the rate of about 750 tons of copper annually, is making a small profit, with prospects for dividends not far removed.

The main working shaft has attained a depth of nearly 2,500 ft. on the incline, with drifts on the various levels passing through occasional stretches of ground fairly well charged with copper, though, on the whole, carrying between 0.5% and

*The finding of the "Lake" lode has caused increased activity in a section where spasmodic efforts and bad management tended to create the belief that there was not the material that makes for dividend payers.*

*Activities traceable to remarkable find made on "Lake" lode.*

0.66% of the native metal. Considerable exploratory work is being done in the nature of crosscutting the formation at depth.

Among the Ontonagon county mines, none of which are dividend payers, the most successful, viewed from every standpoint, is the Michigan. This property includes the old Superior, Rockland and Minnesota mines, the latter, first opened in 1847, having a dividend record of \$1,820,000. Great masses of virgin copper were taken from the Minnesota, the largest, weighing 527 tons, requiring the work of twenty men for more than a year in cutting it into pieces small enough to permit hoisting to surface. The mine was opened on a contact vein, having an amygdaloid hanging and conglomerate footwall, both carrying copper near contact, with the richest ground occurring in a transverse fissure. Nothing under 3% rock was mined. The Minnesota made the serious error in paying out all its net earnings as dividends without first accumulating a surplus, and when in 1879 the company was faced simultaneously by a low price for the finished metal, the necessity for more powerful machinery and a decrease in copper content of the rock mined, the inevitable occurred, and mining operations by the company ceased. During the next ten years, from 1870 to 1880, the mine was worked by tributors, who, without the many conveniences enjoyed by the company, took out nearly \$100,000 worth of copper and, like all tributors, gutted the mine in the levels above the water line. No mine, not even excepting the great Calumet & Hecla, ever yielded such enormous quantities of copper from such limited openings as were had in the Minnesota's best stopes. For nearly 20 years just preceding the organization of the present company in 1899 the tributors continued robbing the old mine, taking out copper overlooked by those who had gone before and developing a firm conviction that millions of dollars worth of copper yet remained in the mine.

The old Rockland and the old Superior mines were never regular producers, though the former gave considerable promise. These mines together produced less than 3,500 tons of copper, the Rockland also having a fair output of native silver to its credit, most of which metal was annexed by the old-time miners. The fact that the company was organized to mine copper only, and therefore not en-

titled to the silver, serving to ease the conscience. After abandonment in 1879 a little "scrambling" was done by tributors.

The present mine is a combination of two entirely new mines and a reopened old mine. Two parallel amygdaloidal beds are worked by a single line of shafts, three in number, the deepest bottomed nearly 2,000 ft. below surface, measured on the incline of the lode. The Branch vein, as one of the twin lodes is known, produces more heavy copper than any other Lake Superior mine, and ranks second only to the famous Calumet conglomerate, upon which the Calumet & Hecla Mining Co. is opened, and from which that company has been able to earn and pay considerably over \$100,000,000 in dividends in the 37 years of its existence. The Calico lode, however, is not so rich and, supplying two-thirds of the total rock tonnage, brings the average copper content of Michigan's entire rock output down to a little under 1% fine copper. The mine is producing at the rate of 1,600 tons fine copper annually and, notwithstanding present low prices for the metal, is making a nice profit. A stamp mill, in the course of erection, is being paid for out of present earnings, and when completed the company will be enabled to treat its own rock at a saving that should aid materially in making the dividends of the future possible.

Michigan began diamond drill explorations a few months ago in the hope of locating the "Lake" lode recently discovered on other properties to the north. As its property extends well across the mineralized zone, its prospects for finding the lode are very good, and should its explorations disclose anything near as rich as this lode, the company will become a very important factor in the production of copper.

Next north of the Michigan is the Mass mine, a consolidation of five old mines, including an ex-dividend payer, the Ridge mine, with a record of \$100,000. Mining operations in the Ridge were carried on intermittently from 1850 to 1882, and it is the only Ontonagon county mine that ever paid a dividend from an amygdaloid lode. Worked at various times by tributors at a profit, a final effort was made in 1881 to put the mine back in the producer class, but the short-sightedness of the directors in voting to expend \$10,000, when \$50,000 was imperative, and the greediness of shareholders, who insisted on taking the profits as fast as made, when profits were earned, and then failed to respond to the call for money when cash was absolutely necessary to keep the mine alive, proved a combination too hard to beat. The struggle did not last long, and the combination likewise.

The old Mass mine was first opened in 1850, on the same lodes worked by the Ridge. It never paid dividends, was always profitable to tributors, and cost the shareholders about \$150,000 in assessments. The mine produced about 2,500

tons fine copper, obtained from rock running better than 1.5% ingot. The Ogima mine was opened in 1890 to a depth of 200 ft. and closed eight years later, during which time a production of 491 tons of copper was secured from the mine and about \$140,000 from the shareholders, the inevitable tributor completing the job by thoroughly "scramming" the upper levels.

The old McRimac, only 40 acres in extent, was organized in 1863 and succeeded in using up \$117,000 of the shareholders' money without coming dangerously near copper production. Two vertical shafts, each less than 100 ft. in depth, still remain where put down, mute witnesses to the ability or honesty, or both, of the projectors. The Hazard did very little work and less of value. A few old test pits and a shallow shaft is the sum total of effort and expenditures made nearly 50 years ago.

The present Mass mine is opened on no less than six different cupiferous beds, opened by one line of shafts and necessary crosscuts. Three shafts are in active operation and producing at the rate of about 1,000 tons fine copper yearly. The rock mined is very low in copper content hovering around the .5% mark, and is the lowest grade rock mined in the Lake Superior district, where the average approximates 1.1% ingot copper. The management is energetic and capable, but the force of circumstances is such that prospects for dividends, the ultimate of all legitimate mining operations, are far removed. With the present low copper content of the rock, the lack of cheaper transportation facilities and the cheapness of the red metal itself, the Mass cannot earn a profit. Exploratory operations, carried on unceasingly the past years, have failed to reveal any promising copper bearing lodes. However, the company has not yet completely explored its lands, nor ceased work of this nature, and a diamond drill put in operation underground at the end of a crosscut in the old mine, is sinking through virgin ground in a horizon corresponding with the lodes encountered by the Adventure's diamond drills on its property adjoining the Mass on the north and east. The Mass should succeed in locating these lodes upon its own lands and find them fairly well charged with copper, if not quite as rich as indicated by diamond drill borings on the lands of the Adventure Co., less than 3,000 ft. to the northeast.

Lying between the Mass mine and the Lake mine, the Adventure, a regular producer of copper until a year ago, is probably attracting more attention than any other mine in the Lake Superior copper district. Discredited and all but down and out, this company began a search for new and more promising copper-bearing lodes about one year ago, and were rewarded beyond fondest expectations when diamond drill borings obtained within the past month disclosed two lodes giving indications of remarkable richness, the cores assaying nearly 4.5% copper.

The present Adventure Cons. Copper Co. is made up of the old Adventure, Hilton and Knowlton mines, these three,

prior to the consolidation, recording a production of not quite 1,000 tons fine copper. The old Adventure mine was opened in 1850 on a long line of pits put down by prehistoric races. More or less success was had by tributors, the mine being exceptionally rich in native silver and mass copper. The Hilton, opened to a depth of less than 100 ft., was worked in the most primitive fashion by hand or horse whims, gophery by tributors, as usual, rounding out its early career. The Knowlton mine, opened in 1853, gave considerable promise, but was given over to tributors in 1865, since which time the property has lain practically idle. None of its workings exceeded 240 ft. in depth.

The Adventure mine of today is opened on seven parallel beds and now abandoned at a depth of less than 1,500 ft. The mine is prolific in silver, but the lumpy character of the ground and the incompetence of those in charge at the mine in its earlier years, when the matter of creating reserve stopping grounds was neglected, made for conditions that the efficient management of later years has found too great to overcome with the limited amount of money available. The company is continuing exploratory work, and two diamond drills now in operation are expected to furnish data regarding dip and strike of the two lodes recently discovered, and upon which a new mine will shortly be opened.

Aside from what the older organizations are doing, further interest and activities are centered in the North Lake Mining Co., a new flotation of the present month. This property includes a part of the old Indiana lands, and is practically all virgin territory. The property adjoins the Lake mine on the northeast and was organized to disclose and mine the Lake lode believed to traverse this property for a distance of nearly 7,000 ft. The company will begin operations with \$300,000 in its treasury, and very bright prospects for a successful future. Exploratory work will be undertaken without delay, and its success, of which there is no doubt, will do much to warding off the notion held by many that Ontonagon county does not possess the material that makes for dividend payers.

**Mexican Steel Production.**—During 1907 the Monterrey Iron and Steel Co. produced 17,875 tons of Bessemer steel ingots, and approximately 35,000 tons of open-hearth steel. Practically the entire open-hearth steel output was consumed by the plate mill, the tonnage of plates aggregating 33,000 tons. The foundry showed a production of 2,400 tons. Owing to the failure of the railroads to provide adequate transportation facilities, the operations during the year were greatly interfered with, and for a considerable period the blast furnaces were compelled to shut down. The company mined 11,800 tons of coal.

All places are secondary deposits; that is, the material of which they are composed was originally derived by erosion of bed rock.

## Bauxite Production and Consumption

BY W. C. PHALEN.\*

The production of bauxite in the United States in 1907 amounted to 97,776 long tons, valued at \$480,330. This is an increase of 22,444 tons, or almost 30% over the production of the year before, and an increase in value of \$112,019, or a little over 30%. The average price of the material at the mines was about \$4.91 per long ton, an advance of but 2 cents over the returns for 1906.

Tennessee has been added to the list of producing states in the southern Appalachian field. Though Arkansas still leads in total production the output from Georgia, Alabama and Tennessee increased in 1907 over 50% as compared with an increase of about 20% in Arkansas. A few hundred tons of ore mined in Georgia, but not sold, have been omitted from the total.

The consumption in the United States in 1907 was 122,842 long tons, valued at \$573,538, of which 25,066 tons, \$93,208, was 93,141 tons, valued at \$431,532, of were imported. In 1906 the consumption which imports represented 17,869 tons, \$63,221.

The world's production of bauxite amounted to 197,912 long tons, valued at \$611,537 in 1906, of which the United States supplied 75,329 tons, \$368,311; France, 115,926 tons, \$229,952; and Great Britain, 6,654 tons, \$13,274.

## Illinois Mineral Production.

The State Geological Survey has just issued circular No. 4, giving the figures of the mineral production of Illinois for 1907. The figures were collected by F. B. Van Horn, formerly of the State University.

There was a remarkable increase in the output and value of mineral products in Illinois in 1907 over that of 1906. The total value in 1907 was \$98,296,908, as compared with \$152,122,648 in 1907. Of the latter figures, however, \$38,842,608 is for pig iron and spelter, which, although actually manufactured in 1906, were not included because the raw material was imported into the state. It has been thought best to include these with Illinois statistics for the year 1907, since similar products are reported by other states. Including pig iron and spelter for both years, the increase was \$31,200,422, or 25.8%. Without these items the increase was still more remarkable, amounting to \$21,083,132, or 36.5%.

The following table shows the values of the mineral output for 1906 and 1907:

Products.	1906	1907.
Coal .....	\$11,763,062	\$54,687,382
Pig iron (estimated) .....	47,125,000	52,728,900
Oil .....	3,275,802	16,472,917
Clay .....	12,743,813	13,351,262
Zinc (estimated) .....	1,499,508	8,614,608
Limestone .....	3,476,449	4,332,651
Portland cement .....	2,461,494	2,632,574
Sand and gravel .....	1,043,041	1,567,653
Natural and slag cement .....	188,262	174,282
Flint .....	160,623	141,871
Mineral water .....	77,287	91,760
Lead ore (estimated) .....	45,760	46,700
Sulphur .....	19,125	14,906
Pyrite .....	.....	5,100
Total .....	\$120,922,226	\$152,122,648

\*Extract from Mineral Sources of U. S. for 1907.

# The Correlation of International Strata—IV.

By HORACE F. EVANS.

The duration of geologic time is certainly vast if we judge it from the paleontological evidence alone. While the formations were accumulating it is known that great changes took place in the distribution of sea and land and the entire physical geography of districts and even regions has undergone a complete change resulting in modifications in the distributions of faunas and floras.

The importance then of finding fossil remains is accentuated when we consider that with the deposition of new geologic systems, the forces of life underwent slow, but constantly repeated, modifications. The old forms disappeared and new ones took their place.

One point should be particularly kept in mind, that is: that the geologic record furnishes us evidence that changes in physical conditions took place in the past more rapidly than those changes have advanced in recent years.

Von Richthofen has given the subject of the succession of volcanic materials in Europe and in North America much attention. The problem which he particularly investigated are the volcanic rocks in five groups and he found the order of occurrence to be the same all over the world. The order he gives is (1) porphyry; (2) andesite; (3) trachyte; (4) rhyolite; (5) basalt. He found that basalt is always the last of the series, although it does not always follow that all the groups are present. He has explained that the eruptions of acidic materials come first and of basic materials subsequently, and these are due to a differentiation of the molten substance within the earth's crust, therefore, the lighter materials are ejected before the lower or even basic ones are.

But geologists differ and the difference appears to be increasing. Mr. Spurr in a recent paper on the theory of ore deposition seems to favor the theory that the heavier materials are first ejected from a volcano and the acidic or lighter materials follow. This theory is not a new one, but certainly Mr. Spurr in his exposition is far from being clear. The subject is of the highest importance in connection with ore deposits, but it should receive slow and orderly attention.

It is admitted that, at best, the geologic record is but fragmentary, and it is known that the intervals separating the periods have frequently been of greater duration than the periods themselves and all evidence tends to prove that geologic history extends over vast ages of time.

Returning to the subject of rocks in the field, it may be said that by paying particular attention to the physical characteristics of the rocks here considered, the reader even possessing a passing acquaintance with Cambrian and Carboniferous rocks, may be able to make a mental separation of the two series.

It is known that the strata of the Rocky mountains proper in Canada contain horizons ranging upwards from the Lower to

*Strata of the Rocky Mountains proper, in Canada, contain horizons ranging upwards from the lower to the upper and including the middle Cambrian.*

*Official classification of the strata of the Nickel Plate beds, B. C.*

the Upper and including the Middle Cambrian. In this country the Lower Cambrian corresponds with the Georgian, the Middle Cambrian with the Acadian and the upper with the Potsdamian. The Georgian or Lower Cambrian in the United States is represented by shales, quartzites and limestones and these contain the fossil *Olenellus*. The Middle Cambrian or Acadian consists of slaty beds 2,000 ft. thick while the upper Cambrian or Potsdamian is represented by sandstones 6,000 ft. thick and are known as Potsdamian sandstones. The *Olenus* is the chief fossil of this division while *Paradoxides* occur in the Middle or Acadian.

The Castle Mountain group in the Rocky mountains proper, in Canada, corresponds with the Lower Cambrian or Georgian of this country. In the field now mentioned the formation consists of limestone, but in the western part, in British Columbia, it consists largely of greenish calc-schists and greenish and reddish shales and slates and no granite rocks, or true crystalline schists are found in any part of the western section.

The section along the line of the Canadian Pacific railway in the Selkirk range of the Rocky mountains, is described by Dawson as occupying a position intermediate between that of the eastern border of the Interior Plateau, and that of the Rocky mountains proper. No fossils have been found in this division, but Dawson considered that the physical characteristics of the rocks were sufficient to correlate this section by analogy with the Castle Mountain and Bow River sections of the Rocky mountains proper.

The basal rocks of the Selkirk section have been classified by Canadian geologists as Archaean and overlying these is a mass of rocks possessing a thickness, it is estimated, of 15,000 ft. These are dark colored and generally blackish argillite schists and phyllites representing various stages between true argillites and micaceous schists. These rocks are very fissile, having glossy and sometimes wrinkled surfaces and often with much minute mica on the division planes, which often correspond to cleavage and are sometimes true bedding planes. They are generally calcareous and frequently contain thin layers of dark-blue and sometimes impure limestones, besides occasional layers of dark quartzite. The discoloring is believed to be due to carbonaceous matter and to the decomposi-

tion in part of pyrite crystals of iron, which are very common in them.

So far as my investigations have gone, I am of the opinion that the beds of Striped mountain on the Similkameen river in British Columbia, where the Nickel Plate and Sunnyside mines are located, correspond very much with the Nisconlith series of the Selkirk section and those in the upper portion of the North Thompson country in British Columbia, though the date may not be quite the same as the latter. These beds are of the Lower Cambrian, or Georgian, date (by analogy) and are known to be for the greater part carriers of gold and silver. Though it is officially stated that no organic remains have been found in the beds of the Striped mountain area yet I have found vermes there which may perhaps prove on investigation to be *Salterella Maccullochi* of Lower Cambrian.

As I have enumerated the rocks of the Nisconlith Lower Cambrian (Georgian) series I may just as well here present all sides by side with the Nisconlith beds those of the Nickel Plate as they are officially and unofficially given.

Official classification of the strata of the Nickel Plate beds, B. C., is:

(1) Red, gray and some black argillaceous and siliceous beds unstratified in thin bands. (2) Blue and white limestones, much altered and crystalline with some siliceous beds and breccia. (3) Argillaceous and siliceous beds on the west side of 20 Mile creek.

Unofficial classification of the strata:

(1) Argillaceous rocks very much silicified gray and red, 300 ft. (2) Limestones including siliceous intercalation, 150 ft. (3) Argillaceous beds silicified gray and red, 600 ft. Of course, the measurement denotes only the portions seen and many of the changes which the rocks have undergone on Striped mountain are due to the influence exercised by plutonic and volcanic rocks and igneous dikes. Further reference will be made to these beds in a later paper.

The information with regard to the occurrence of Archaean rocks in British Columbia is not abundant, but by analogy these rocks are correlated with those to the east of the Rocky mountains, especially in Canada. The Archaean rocks by American geologists are restricted to a great series many thousand feet thick. There is another series above these of similar thickness, comprising the metamorphic series of some authors and the pre-Cambrian of others, but Canadian official geologists do not recognize a metamorphic series in the field in question. Very little is known of Archaean rocks occurring in British Columbia, and as supposedly Cambrian rocks in that country differ in physical characteristics, at least, from Cambrian rocks in the Rocky mountains and farther eastward, it may be reasonable to suppose that differentiation is due to physical geologic conditions.

I have made some investigations into the Archaean rocks of the interior plateau

of British Columbia, and I have in mind a very ancient granite on Grawood mountain about 25 miles south of the South Thompson river where there are quartz veins that appear to have segregated from pegmatites when the latter were cooling. The occurrence of the old granite is officially recognized by some members of the Canadian Geological Survey.

For reasons that must hereafter appear justifiable to subsequent observers, I have attached much importance to the Nisconlith series of the supposedly Cambrian and that large assemblage of rocks believed to be carboniferous which stretches east, northeast and southeast from the junction of the north and south Thompson rivers in British Columbia. It may well be that the Nisconlith series differ in two local areas where they occur, but in the main it has been found that the Nisconlith series corresponds with the Bow River series of the Rocky mountains proper where there is an exposed thickness of 1,000 ft., the base being nowhere seen. The Selkirk series carries the Nisconlith and it has a thickness of 25,000 ft. and no distinct line of division occurs. The rocks comprising this great assemblage is a great mass of gray schists and gray quartzites some of which have been dolomitized. The quartzites prevail, often grading into quartz grits and fine grained conglomerates, these becoming schistose from the pressure to which they have become subjected. They are colored from gray to greenish-gray and in some instances have become true sericitic schists.

These rocks in general represent the Castle Mountain-Cambrian group of the Rocky mountains proper. Their thickness is about 10,000 ft. They correspond in the main with the Adams Lake series in the great development of the quartzite and the quartz conglomerate, though these have certain representatives in the Adams Lake series. They were named the Selkirk series rather than give to them an equivalency with the rocks of the Adams Lake and Castle Mountain group, and the comparison of the latter with the former rests on lithologic grounds.

In the Rocky mountains proper, Olenellus, the lowest Cambrian fauna is known to be common in the lower part of the Castle Mountain group and in the upper part of the Bow River series, the separation having been made at the base of the distinctly calcareous upper part of the Cambrian, while certain quartzose conglomerates found in the upper part of the Bow River series are represented by similar conglomerates, which abound in the upper series of the Selkirk and no uniformity is known to occur between the upper and the lower masses of strata in either place.

While in the Selkirk area, the lower of the two great series, which have been described, resembles the Nisconlith so closely as to justify extending to it the same name. The circumstances that the overlying members of the section differ considerably from the Adams Lake series of the interior plateau, though on the east side, it evidently not only represents the whole of the Castle Mountain group, but also the upper part of the Bow River

series of the Rocky mountains, and, therefore, it became necessary to apply to it a provisionally distinctive name.

It would evidently have been no inaccuracy to unite the Adams Lake and Selkirk series under one of these names.

In summing up this matter in his retrospect Dawson wrote that, regarded as a whole he found reason to believe that the Selkirk and Nisconlith series farther to the westward comprise a local representative of a great Cambrian formation having an aggregate thickness of 25,000 ft.

This formation by analogy with the Rocky Mountain sections includes the lower part, the Ordovician of some authors, and extends without stratigraphical break down to and far beneath a horizon at which the Olenellus or Lower Cambrian fauna is found.

### Bromine Industry of U. S.

Bromine, used mostly in the form of alkaline bromides in medicine and photography, but also in its elementary form in the manufacture of dyes, as a disinfectant, and in certain metallurgical operations, is produced commercially in this country in four states—Michigan, Ohio, Pennsylvania and West Virginia, named in order of relative importance. In 1907 these states produced 1,379,196 lbs. of bromine, valued at \$195,281, the average price per pound being a little more than 14 cents. The trade conditions were therefore somewhat better than in 1906, for in that year, though there was an increased production over 1905 of 90,492 lbs., there was a decrease in value of \$13,710, and the prices fell to an average of 12.8 cents per pound. As compared with the production of 1906, the output for 1907 shows an increase of 96,216 lbs. in quantity and of \$30,077 in value. Prices were extremely low in 1907, some of them barely equal to the cost of production. The low prices are in large part, if not wholly, due to the heavy importation of German bromides.

The bulk of the domestic output of bromine in 1907 was furnished by Michigan, large quantities of bromine and bromide being made at Midland and Mount Pleasant by special patented processes. Bromine was made as a by-product in 1907 at Pomeroy, Meigs county, Ohio, and at Hartford, Mason county, W. Va., towns about 5 miles apart on Ohio river, along one of its sharp bends. It is also made at Mallett, on Kanawha river, a few miles southeast of Charleston, W. Va.

According to Consul Isaac A. Manning of Cartagena, Colombia, Narino and Antioquia are very rich mineral districts, but that prospecting is proceeding very slowly. According to official Colombian reports, during the month of December, 1907, filings were made on only 37 quartz prospects and 18 placer claims in Narino, and in Antioquia only 52 quartz veins and 22 placer claims were filed on from September to December. There has been a total of 589 filings on placer and quartz mines in Narino and 5,550 in Antioquia, of which latter titles to 1,183 have been granted.

### Russian Iron Ore Industry.

BY JOHN H. GROUT.\*

Among the various valuable minerals of South Russia are found rock salt, coal, coprolites, kaolin, sands for glass making and other purposes, manganese and iron ores, the latter easily taking the first place in point of importance. A small village was part of a cavalry regiment was stationed, Krivoi Rog, "Crooked Horn," was but little known outside of a small radius until about a quarter of a century ago, when the outcropping of vast layers of iron ore in its neighborhood began to attract attention. At first an article of secondary importance, limonite ochre, a ferruginous clay, appeared in the market, but very soon the substrata of quartzite embodying unusually rich layers of iron ore became known. Up to that period South Russia had been forced to import vast quantities of iron. Under these conditions the Krivoi Rog ores were taken up with great avidity by metallurgists of the region and the development of this mining industry was rapid. Soon there was more iron ore mined at the Krivoi Rog than could readily be taken up by the metallurgists of the district and attempts were made to export it. These attempts coincided, first with a period of great demand for ores in the world's markets and later on with a keenly felt depression.

At present this industry is in a languishing condition, due in a measure to an attempt to make some other disposition of the surplus ore. More than once it has been suggested that the government would be wise to forbid exportation of these products in order to retain within the country these valuable ores, upon the supposition that there is but a limited quantity, which has been estimated at 18,000,000 to 20,000,000 short tons.

There are 73 mines, belonging to 31 separate companies or private persons. Of these, 18 mines are in operation and 55 idle. These 31 owners possess among them 9,581 acres of land and they rent 26,501 acres. The payment of rents nearly always takes the shape of royalties and is very low, the average amount paid being about 14 cts. per ton extracted, but in some cases six times as much. The area actually occupied by the mines is about 341 acres, which is worked from above ground and 58 acres mined underground. The work is now carried on from 35 to 350 ft. below the surface. The thickness of the ore-bearing stratum varies from 7 to 100 ft., while the cut-away clinal ends are covered with 3 to 150 ft. alluvium. The quantity mined in 1904 was 3,670,000 short tons.

Manual labor, horse, steam and electric power are employed. The average production per annum per man has amounted to 388 short tons, or 588 short tons if actual miners alone are taken into consideration. The rate of remuneration for the miners and unskilled laborers varies from \$118 to \$206 per year. The men many of whom have come from long distances seeking this work, are comfortably housed and fed at the expense of the mine. Sanitation is well looked after.

\*American Consul at Odessa.

# The Beach Placers of the South Pacific Coast.

By C. D. IRVINE.

While hundreds of assays have been made as to the values contained in the auriferous sands of the beaches of the South Pacific Coast, the only real test was made on a carload of this alluring magnetic or black sand, which was sent to Portland, Ore., for treatment by the government experts during the progress of the Lewis and Clark Exposition two years ago. This sand was shipped from Shakespeare beach, near Redondo, and weighed 12,912 lbs. The agents of the government who were making the experiments found that the sample shipment yielded \$1.65 per ton in gold and platinum. By concentration on a Willey table the bulk was reduced to 211 lbs. of first concentrates, which yielded at the rate of \$94.74 per ton in gold and platinum. The 651 lbs. of middlings gave but \$0.04 per ton, and the 11,120 lbs. of tailings showed only a trace of the metals of the royal group. The composition of the sand was determined to be as follows, per ton: Magnetite, 54.8 lbs.; ilmenite, 30.7; garnet, 8.6; olivine, 30.2; titaniferous hematite, 2.9; zircon, 2.2; quartz, 1,766.8; and other minerals, 103.8.

As beach sand weighs about a ton and a half to the cubic yard, it will be seen that the average yield of the large sample tested was \$2.47 per yard—ample to justify the treatment of the sands, provided a practical and economical method for the separation of the rare materials were at hand, and if such sands were to be found in any considerable quantities.

So many inquiries have been made of the California State Mining Bureau for information regarding these sands that State Mineralogist Lewis E. Aubrey has recently issued a bulletin dealing with the subject, for the purpose, he says, "of correcting many wrong impressions which have been formed concerning the auriferous black sands of California." J. A. Edman, who has given many years of study to the subject, is quoted as saying that the outbreaks of popular excitement in reference to new discoveries have been directed toward the actual or imaginary value of the heavy sands derived from gold-bearing gravel deposits; but the golden sands of fabulous richness have invariably proven limited as to extent and ephemeral in their nature. "The alluring prospects," he says, "are founded on the basis of the extensive, but mythical, black sand deposits of the Pacific Coast."

The first and most notable popular excitement of this kind occurred in April, 1851, when the beach deposits in the vicinity of Gold Bluff, Humboldt county, led to quite a rush of San Francisco miners to that locality, all eager to rock a fortune out of the glistening sands. During the succeeding year the coast of Southern Oregon had the call. Some half-breeds discovered gold in the beach sands at the mouth of a creek a few miles north of the Coquille river, where the old town of Randolph was established. There was a great rush to these beach diggings, and wonderful are some of the stories that have been told of the

*Irregular values of the deposits, the fineness of the gold and the difficulty of recovering it from the magnetic sands, makes this class of mining generally unprofitable.*

*Gold Bluff, Cal., scene of first and most notable operations of beach sand mining.*

riches uncovered. Bancroft, in his history, records the report that one mine alone yielded \$100,000. Soon after the discovery was first made there were 1,000 miners at work along the stretch of beach from the California state line north to Coos bay. The mining town of Elizabeth sprang into existence, and Gold Beach received its name on account of the richness of the sands of its shores. But only the richest of the claims paid well. The irregular values of the deposits, the fineness of the gold and the difficulty of recovering it from the magnetic sands soon worked a practical abandonment of this field and sent the miners back to the interior placer districts.

While no great fortunes have ever been piled up by beach miners, there is ever following a new generation to walk in the footsteps of the disappointed pioneers. Their discouragements argue naught to the newcomers, and consequently from the British possessions on the north, following the coast lines of Washington, Oregon and California to San Diego, and beyond on the south, the prospector is to be found.

One process of saving the values succeeds another with such regularity that at places along the beach the story of the failure of one attempt is no sooner read in the wreckage along the beach than along comes another hopeful spirit with an entirely new system to be exploited, and thus the endless and profitless chain is maintained.

The gold present in the beach sands is in the form of minute scales or particles of native gold, and when from 20 to 30 of the flakes or colors are found in a single pan the inexperienced beach miner at once concludes that the sand is well worth working, and will run perhaps \$1 to the cubic yard. But these colors invariably prove the *ignis fatuus*, for, as a matter of fact, the value of 600 colors is but one cent, and if 200 shovels of sand of 2 lbs. each should each yield 20 colors, the value of the ton of sand thus treated would amount to but 10 cents. In this fact alone lies one fruitful source of disappointed hopes and unsuccessful enterprises in the working of auriferous beach sands.

The flour gold of the beaches is uniformly fine and commonly flaky. To such an extent is it flaky that at particular deposits the particles absolutely float upon the water, and the gold cannot be effectively brought into union with mer-

cury. It is maintained by some scientific investigators that there is a sort of skin or coating upon the gold, which prevents the amalgamation. This coating is supposed to be composed of iron sulphide, derived from decomposing sulphurous compounds somewhere present. Frequently these scales or flakes assume the shape of small cups or basins, and are thus easily moved by floating water or moving currents of air. When exposed to the air and immediately immersed in water they will frequently float with persistency on the surface of the liquid, on account of the minute bubbles which collect upon them.

Half a century after the pioneer gold hunters went through the excitement of Randolph and Whiskey Run, practical mining men returned to the deposits and left the result of their investigation in a government report. These researchers were Messrs. Sharpless and Winchell, who said the sands contained garnets, rubies, magnetite, ilmenite, chromite and iridion, as well as gold and platinum. They found that the size of the gold flakes or colors varied widely, some being so small as to be barely visible with the naked eye, while others range from one-sixteenth to one-eighth of an inch in diameter. On account of their extreme fineness, the prospector is inclined to overestimate the value of the gold in the sand which is being prospected with a pan. Thus, when from 20 to 30 colors are found in a pan, it is usually concluded that the sand is worth working and will run \$2 or \$3 to the cubic yard. This was found to be a mistaken estimate as applied to beach colors, the average value of ten samples treated by them having been but 55 cents per ton.

It is quite well agreed among geologists that the source of the black sands of the beaches is to be found in the crystalline rocks of the auriferous slate series. These contain not only the gold, but the silver, nickel, platinum and other precious metals. It is a belief of miners that the deposits are renewed from year to year by the winter storms, the gold being derived immediately from the Eocene shales and sandstone by the concentrating action of the streams and waves.

In an exhaustive discussion of the origin of gold beach sands, Heribert Lang says these sands are in reality a modified form of placers. They principally differ, in his opinion, from ordinary placers in that the winnowing process has been carried to a much greater extent. "It is to the eroding power of the mountain streams and the sorting power of the sea waves," says Mr. Lang, "that mankind owes the black beach sands. The former broke the gold and the magnetic grains from the solid rock and carried them seaward; the latter winnowed them again and again as they lay with other sands and metallic particles upon bars at the mouths of rivers, and the heavy sands and whatever of gold particles that possessed an equal resistance to the action of aqueous currents paused in the

locality, pairing off together, so to speak."

In treating of the same subject, a bulletin of the government ascribes the origin of the beach auriferous deposits to the quartz veins of the Myrtle formation. This bulletin says the supply for the stream gravels has been direct, but at least some of that on the beach has been derived from Tertiary beds by wave action on the beach, indicating that the quartz veins of the Myrtle formation are more ancient than the beginning of the Tertiary.

In summing up the origin of the beach placers, Arthur Lakes makes the deduction that plutonic sea cliffs were washed by primitive seas, their gold particles scattered in the beach sands, winnowed and separated and consolidated later into coarse sandstone rocks, carrying their modicum of gold. In his opinion, the igneous rocks were the original progenitors of the gold which is found in traces in the marine shales.

But as to theories dealing with the origin of the gold there is a wealth. Some hold that the values come from the crystalline rocks, while others say they are washed from the rocky strata along the shore, which, becoming worn and disintegrated by the waves so as to set free the gold. Yet others argue that the gold carried in solution in the water of the ocean has been precipitated in the sand.

Economic uses are being found for the several metals associated with the gold and platinum of the beach deposits. The monazite, which is found to contain 4% of thorium, is a valuable constituent of incandescent gas mantles. The zircon derived from such sands is exceptionally pure and well adapted to the manufacture of mantels and electric lights of certain designs. The chromite is utilized in the manufacture of refractory furnace linings. Ilmenite has been proven as desirable in connection with the manufacture of electrical apparatus. The magnetite is used with much success in the manufacture of pencils for use in electric arc lights and proves an acceptable substitute for the ordinary carbon pencils. Steel products can also be manufactured from the magnetite, while experiments are in progress looking to the utilization of the quartz properties of the sand itself in the manufacture of glass, which would obviate the necessity of the importation of such sands from Germany.

Eliminating gold from the "noble" group, the six metals of the platinum group—all found in greater or less quantities in the beach placers—are adapted to a diversity of uses. Palladium, which is nearly always alloyed with platinum and iridium, is highly prized in the manufacture of scales and division marks on scientific instruments. Mixed with mercury, it is sometimes used as a filling for teeth. Osmiridium, being a combination of platinum containing iridium and osmium, is extremely hard and is used for pointing non-wearing pens. Osmium compounds are used in the precipitation of bacterial organisms from water and other liquids. It is also used in microscopic work and in the construction of electric lamps. Iridium is used in hardening platinum. The knife

edges of delicate balances and other bearings which require extreme hardness are often made of it. An alloy of 10% iridium and 90% platinum has been found to be but very little effected in volume by changes in temperature and is the substance in which the standard meter at Paris is made.

### California's Coal Output.

The production of coal in California in 1907 was the smallest reported in the state since mining began in 1861, according to E. W. Parker, of the United States Geological Survey. The increased production of petroleum and its use for fuel purposes have had a most demoralizing effect on the California coal industry, and except for domestic purposes there is little market for the product. From 77,450 tons in 1905 the coal output decreased to 25,290 tons in 1906; in 1907 the total production was but 13,950 tons, valued at \$38,213. During 1907, however, a considerable amount of development work was done at the Stone Canyon coal properties in Monterey county, and when transportation lines now in course of construction have been completed to this field, which lies 25 miles from the Southern Pacific railroad, the coal output of California will probably be greatly increased. The domestic market has in the past been supplied by coal from the subbituminous (black lignite) mines of the Mount Diablo and Corral Hollow fields in Alameda and Contra Costa counties, by coal brought in from Oregon, Washington, and British Columbia, and also, to some extent, by coal from Japan and Great Britain. The Monterey county coal is true bituminous and is of much higher grade than that produced in other parts of the state or at Coos Bay in Oregon. It can be delivered at San Francisco and other cities in the state at less cost than the coals brought from other sources and should find a profitable market.

The attempts at briquetting which have been made do not seem to have resulted in the increased utilization of the subbituminous coals of Mount Diablo and Corral Hollow. It is probable that this is due partly to the form of the briquets, which makes them more suitable for power purposes than for domestic use; moreover, the briquetting industry has suffered because of the competition of the product with fuel oil.

### Coke Making in Colorado and Utah.

The production of coke in Colorado and Utah amounted in 1907 to 1,421,570 short tons, valued at \$1,717,136, against 1,455,905 short tons, valued at \$4,501,748 in 1906, indicating a decrease of 31,326 short tons, or 2.36%, in quantity and a gain in value of \$242,688, or 5.39%. The average price per ton advanced from \$1.09 in 1906 to \$1.34 in 1907.

One new establishment was completed in Colorado in 1907, increasing the total for the two states from 17 to 18 and the total number of ovens from 1,163 in 1906 to 1,683 in 1907. One establishment of 25 ovens was idle in both years.

For several years prior to 1906 prac-

tically all of the coal used in the manufacture of coke in Colorado and Utah was slack, a large part of which was washed before being charged into the ovens. Of the total quantity of coal (2,388,911 short tons) converted into coke in the two states during the last calendar year, 679,182 tons was run-of-mine, of which 676,226 tons was washed. In 1906 the run-of-mine coal used amounted to 706,306 tons, of which 703,440 tons was washed. The slack coal used in 1907 amounted to 1,709,729 tons, of which 654,549 tons was washed and 1,055,180 unwashed.

### Colliery Notes.

The Pennwood Coal Co. of Rockwood, Pa., has increased its capital stock to \$1,000,000 and provided for a bond issue of \$1,000,000. The company is controlled by New York, Baltimore and West Virginia people. Hugh L. Kirby, of Harper's Ferry, W. Va., is the president. In addition to its original holdings of 1,276 acres in Somerset county, Pa., the company has just acquired 3,900 acres of adjoining coal property, giving it a total acreage of 5,176. The land is well located for marketing the coal, having a frontage for a number of miles on the Connettsville division of the Baltimore & Ohio railroad and also on its Somerset and Cambria and Berlin branches. The different properties are developed and ready for operation. Mines are now open at Rockwood and Garrett and there are coaling stations at both places.

An attempt is being made to organize a company to supply the northwestern states with Pennsylvania and Ohio Valley coal, to be shipped in barges on the Ohio and Mississippi rivers. By transporting coal to the twin cities by water the promoters figure they can do it for about half the cost of transporting it by rail to the great lakes, across the water by boat and then on cars again, the present route of Ohio Valley coal to the northwest. Grant Van Sant, son of the former governor of Minnesota, is the chief promoter.

An equity suit has been filed in the county court at Washington, Pa., by the New York Trust Co., as trustee, against C. Jutte & Co., of Pittsburgh, in which it is asked that a sale be made of certain coal properties in this county to satisfy a claim. It is stated by the petitioners that the defendants gave a mortgage for \$1,600,000 to secure bonds, and the allegation is made that interest on the bonds has been in default from the start.

Fifteen suits for damages aggregating \$675,000 have been filed in the United States circuit court against the Pittsburg Coal Co., as a result of the Darr mine disaster at Jacobs Creek, Westmoreland county, Pa., Dec. 19, 1907. The suits allege negligence on behalf of the owners for having only an air shaft, permitting the removal of pillars, and failing to have the mine properly inspected. The suits filed are in addition to the 18 suits filed about a month ago. The total damages asked to date of the coal mine owners are \$750,000.





# Current Literature on Mining, Metallurgy, Etc.

*Precipitation and Clean-up at the Kendall Mill, Mont.* E. B. Cooleidge. The ore treated at this plant is an oxidized silicious ore and is an altered lime, occurring in a lime formation, near the intrusion of a porphyry dike. The method of precipitation of the gold values is by means of zinc shavings. The zinc consumption is about 5 lbs. per ton of ore treated. Four boxes are used and the amount of solution and wash passing them is from 500 to 600 tons per 24 hours.—*West. Chem. & Met.*, Aug., 1908; pp. 3, 75 cts.

*Mines of Penoles Co., Mapimi, Mex.* Claude T. Rice. In the mines of this company the ore occurs in chimneys and pipes in limestone. Modern mining methods are in vogue, including use of diamond drill. Some novel features in mining engineering are in evidence.—*E. & M. J.*, Aug. 8, 1908. Pp. 5½; illus. 20 cts.

*The Influence of Fine Grinding on the Physical Properties of Portland Cement.* Richard K. Meade. Presents the results of some carefully made experiments to determine the actual commercial value of fine grinding.—Abstract of paper read at Atlantic City meeting of the American Society for Testing Materials; published in *Eng. Rec.*, Aug. 15, 1908. Pp. 2½; illus. 20 cts.

*New Mining and Milling Practice on the Rand.* Eustace M. Weston. Another aspect has been given to almost every mining enterprise in this field by the very large reduction in costs. Signs are not wanting to show that the inflow of capital, necessary to develop and work the ground many square miles in extent, now lying idle, is available.—*E. & M. J.*, Aug. 15, 1908. Pp. 2; illus. 20 cts.

*Suggested Mining Methods for Pittsburg Seam.* R. Y. Williams. A new plan for mining the Pittsburg No. 8 bed by which greater safety may be attained and losses of coal reduced 30%.—*E. & M. J.*, Aug. 15, 1908. Pp. 2½; illus. 20 cts.

*Property and Prospects of La Rose Mines, Cobalt.* Alex Gray. Describes the geology and development of the property and gives the ore shipments and recovery of silver, cobalt, nickel and arsenic during the past four years.—*The Mining World*, Aug. 15, 1908. Pp. 4; illus.

*The Petroleum and Manjak Industry of Barbados.* Edmund Otis Hovey. Oil of the island of Barbados is thick and heavy and is known locally as "tar." Intimate relation exists between the petroleum and the "manjak," the latter being derived directly from the former.—*The Mining World*, Aug. 15, 1908. Pp. 2; illus.

*Balances.* A. Austin and Swift Hunter. The principle underlying the ordinary chemical and assay balance is that of a lever of the first class, with arms of equal length, the power and weight consisting of the force exerted by gravity on the masses carried in the pans. This

lever when constructed in the form of a beam working balance must combine certain properties in order that it may possess the requisites for accurate weighing, namely, sensitiveness and stability of poise.—*M. & S. P.*, Aug. 15, 1908. Pp. 2½; 20 cts.

*In ordering, give date of The Mining World in which the article has been mentioned. All orders are payable in advance.*

*Progress in Use of Suction Gas Producer Power.* L. P. Tolman. American gas producers are recommended for American coals and lignites. Describes the various types of the suction gas producer and the development of same.—*The Mining World*, Aug. 15, 1908. Pp. 5; illus.

*Potter Systems of the Mines of the Joplin District.* D. F. Boardman. Of the three types in use the gas engine plant shows the greatest economy, the first cost being slightly less than for steam. A most interesting example of a double power installation (electricity and steam) to do the same work is given.—*E. & M. J.*, Aug. 15, 1908. Pp. 2½; illus. 20 cts.

*The Auriferous Deposits of India.* Dr. Malcolm MacLaren. India's auriferous deposits, both vein and placer, have been carefully prospected and assiduously worked for at least 25 centuries—and that by a people whose skill is noteworthy and whose patience is monumental.—*Mg. Jnl.*, Aug. 15, 1908. 4,000 words; illus. 30 cts.

*The Correlation of the International Strata.* Horace F. Evans. This is the third of Mr. Evans' very interesting series of articles on this subject, and is devoted mainly to the pre-Cambrian formation in the eastern and western portion of the Dominion.—*The Mining World*, Aug. 15, 1908. P. 1.

*Recent Developments in Gold Dredging.* Frank W. Griffin. The results achieved in gold dredging during the past few years are more far-reaching and solid than those attained in the earlier days of dredging for gold. There has been no radical change in the design of the dredge itself, which is now an effective, well-balanced, reliable machine. Progress has taken place in general improvement in essential mechanical details, together with important modifications of the gold-saving appliances.—*M. & S. P.*, Aug. 15, 1908. Pp. 4½; illus. 20 cts.

*Bolivia: A Sketch of Its Metallurgical, Mining and Electrical Equipment.* R. C. Sharp. Few people have any conception of the advancement that has taken place in Bolivian mining methods and machin-

ery, or that it possesses today some of the best equipped metallurgical establishments in the world. The majority of these reduction works are, however, comparatively small, the richness of the ores permitting of large products from small crushings.—*Eng. Rev.*, Aug., 1908. Pp. 8; illus. 40 cts.

*Occurrence and Uses of Molybdenum Ores.* Describes the occurrence and distribution of molybdenum ores with their commercial value.—*Bul. Imp. Inst.*, Vol. VI., No. 2. Pp. 9. 40 cts.

*The Cost of Silver-Lead Smelting.* Walter Kerton Ingals. This is mainly a study of the American Smelting & Refining Co., which is estimated to have made a profit of \$2 per ton of ore smelted. The writer attempts to deduce from the official reports of the company some general conclusions as to its treatment of the mining industry.—*E. & M. J.*, Aug. 8, 1908; pp. 6; illus. 20 cts.

*The Operation of Electrical Machinery.* Norman G. Mcade. Suggestions for installing a new plant, with special regard to location of apparatus and operating the generators.—*Power*, Aug. 15, 1908. Pp. 2, illus. 20 cts.

*The High-Pressure Hydraulic Elevator.* William Baxter, Jr. Gives instruction with regard to the adjustment and care of automatic stop valves and mechanism and how to pack the different parts and the kinds of packing used.—*Power*, Aug. 15, 1908. Pp. 4; illus. 20 cts.

*Provisions of Mexico's Proposed Mining Law.* José Luis Requena. Discusses the proposed changes in the mining code of Mexico which has brought about much discussion throughout Mexico, as well as in foreign financial circles.—*Pan-American Magazine*, July, 1908. Pp. 5. 40 cts.

*Electrical Equipment at the Ferndale Collieries.* The advantages to be obtained by the use of electricity in mining are being realized at an increasing rate by colliery proprietors in Great Britain, and already a large number of coal mines in the South Wales district have completed or have under construction electrical equipments of considerable magnitude.—*Elec. Eng.*, Aug. 6, 1908. Pp. 8; illus. 30 cts.

*The Design of Air Compressor Valves.* The suction and delivery valves of an air compressor are the most important parts of a machine, as on these depend its efficiency and ability to run for any length of time without breakdown.—*Mech. Wld.*, Aug. 7, 1908. Pp. 1½; illus. 30 cts.

*Calculating the Value of a Mine.* J. Bowie Wilson. The most important work of a mining engineer is the estimation of the true value of a mine by calculating the tonnage and value of ore available. More attention is now being paid than formerly to scientific mining, as it is fully realized that after all proper sampling is the most important factor in determining the value of a property.—*Aust. Me. Stand.*, July 8, 1908. Pp. 1½. 30 cts.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as new items of sales made, and illustrated descriptions of new inventions or improvements.

### Recent Improvements in Air Compressors

BY H. EESIL BARR.

The accompanying illustration refers to recent designs in air compressors of 12 and 14-in. stroke, by the Bury Compressor Co., Erie, Pa. The massiveness and rigidity of these machines is apparent at a glance, the frames being of the bored guide type with heavy duty half-box bearings, which are tied into the frame body by heavily ribbed, long sweep housings. The cylinders, air and steam, are held rigidly in line by the circular, internally flanged yoke, which is provided with large side holes for conveniently reaching the stuffing boxes.

The machine proper—frame and cylinders with attached parts—is mounted by means of through and tap bolts onto an unusually deep sub-base, which on two stage machines includes the intercooler, making the entire outfit self-contained, of permanent alignment and adapted to run as satisfactorily on a good timber cribbing as on a more permanent foundation of concrete or brick.

Crank shafts and connecting rods are of forged open-heart steel. The crank of the duplex machines is of the built

and boxes being lined with babbit and crosshead boxes of phosphor bronze.

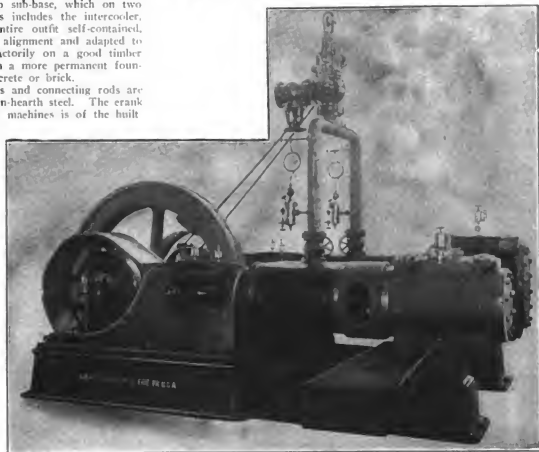
The crosshead is of box form with adjustable shoes and steel wrist pin drawn in on a continuous taper and securely fastened. The steam valve is a balanced, double-ported slide type, giving very short steam ports and eminently suited to the operation of a compressor or engine—giving good, economical service with little attention aside from lubrication.

The steam cylinders are lagged with asbestos to prevent undue loss from radiation and are fitted with a heavy polished blue steel jacket. The duplex cranks are covered by a polished steel guard with heavy angle-iron pieces, and the single crank may also be so fitted. The air valves—the vital parts of any compressor—as ordinarily furnished are

wall only. A slight application of graphite and oil prevents rusting at this point. The portion of the guide entering the cylinder wall is not threaded and is a comparatively free fit, tightness being secured by screwing the guide down on a thin, corrugated copper gasket under the shoulder shown. The inside of guide near bottom is of hexagonal shape, used to engage a special wrench furnished for the easy removal and replacing of guide. The cap which firmly locks the guide has a hexagonal projection which is engaged by the same wrench which fits guide.

On the high pressure cylinder of two stage machines a copper gasket is also placed under cap, so that the fit into cylinder is not depended upon in any way for tightness and the guide can be removed quickly.

The discharge valve guide screws into the discharge passage wall and rests on a corrugated copper gasket on cylinder wall. The seat is contained with the guide, avoiding all wear on the cylinder,



The Bury Air Compressor.

up type, with balanced disks forced on to shaft and held by two keys. The pin is forced in and riveted.

The single crank shaft is slotted from a single forging, pin and journals turned with large fillet—and shaft is fitted with counterweighted disks mounted on the wings of crank by a superior construction—joints being all machined and no babbit or other soft metal liable to loosen from shrinkage being used. The connecting rods have the approved marine crank end and solid crosshead end, crank

of the automatic, direct lift type with spring closure, operating in guides of a recently improved form.

The most common form of inlet valve guide is made of brass and screwed into the wall of cylinder or head. This thread is straight, and being depended upon to a great extent for tightness, is made a good fit in the tapped hole. The guide is made of brass.

The guide and seat are one piece, an iron casting, which screws into the metal of the cylinder in the cool air passage

and the seat being removable is readily inspected and valve ground in without danger from emery entering the cylinder.

By a simple device the discharge valves are rendered quiet running and very positive in operation. The positive inlet valves, furnished on special order only, are placed in the cylinder barrel instead of in the heads. Lubrication is effected by sight feed devices or by force feed or gravity system, as desired.

These machines are fulfilling the manu-

facturers' expectations and the favorable comments received from experienced engineers who have seen them in operation have been very gratifying.

### Trade Publications.

**Railroad Equipment.** Arthur Koppel Co., Pittsburgh, Pa.

Shows Koppel cars and locomotives in operation on outdoor construction work, such as railroad building, concrete work, excavating work, etc. Particular attention is called to the Koppel double side dump cars, which can be dumped on either side.

**Ore and Mine Cars.** The Killbourn & Jacobs Mfg. Co., Columbus, O. Catalog No. 60. Pp. 46; illustrated.

Gives a brief description of the company's large line of ore and mine cars, which include automatic ore cars, bottom dump cars, coal cars, double truck gable and hopper bottom cars, heavy mine cars, rocker dump cars, sand cars, scoop cars, etc.

**Electric Rotary Drill.** The Jeffrey Mfg. Co., Columbus, O. Bulletin 16. Pp. 12; illustrated.

A brief description is given of the Jeffrey A-5 electric rotary drill, which the company claims will drill any material which can be penetrated by an augur bit. It is especially designed for drilling coal, slate, shale, rock salt, clay, gypsum, soft rocks, etc.

**Hydraulic Gravel Elevators and Water Lifters.** Joshua Hendy Iron Works, San Francisco, Cal. Bulletin III. Pp. 32; illustrated.

A brief history of the hydraulic gravel elevator and its use in placer mining operations is given. The improved Hendy hydraulic elevator is fully illustrated and described, showing the various types made and the different classes of material used in their construction. A table is also given showing the loss of head in pipe by friction.

### Industrial Notes.

The Byron Jackson Iron Co., Berkeley, Cal., has had plans prepared for additions that will cost in the neighborhood of \$200,000. The additions include a pattern storage house and an annex to the machine shop.

The Canadian-Weber Gas Engine Co., Ltd., has been incorporated to conduct a foundry and machine shop business at Toronto, Ont., with \$300,000 capital. The incorporators are Robert G. Weber, Robert J. Goudy, Hiram Kibely and others.

The Deister Concentrator Co., Fort Wayne, Ind., reports the sale to the Caucas Copper Co., Ltd., of London, four No. 3, Deister concentrating tables and to the McKinley-Barragh-Savage mines, Cobalt, Ont., eight tables.

L. S. Pierce, Denver, Colo., reports the following recent shipments of Pierce Amalgamators: Aurora Mining Co., Aurora, Honduras; Dixie Royal Mining Co., Dixie, Idaho; Roper Morgan Co., El Paso, Tex.; Blythe-Tracey Co., Los Angeles, Cal.; Hillabee Gold Mining Co.; Eagle River Mining Co., Alaska.

### Personal.

W. C. Greene is seriously ill at Honolulu, H. I.

Samuel Newhouse of Salt Lake, Utah, is in New York city.

James C. Besley of Hermosillo, Sonora, Mexico, is in New York city.

H. L. Percy of the La Magistral mine, Jalisco, Mexico, is in New York city.

E. W. Carpenter of Delaware, Ohio, is visiting his properties near Wickenburg, Ariz.

S. F. Shaw, mining engineer, San Bernardino, Cal., is in Mexico making mine examinations.

Arthur W. Jenks, mining engineer and metallurgist, Seattle, Wash., is in Alaska on professional business.

D. C. Jackling, manager of the Utah Copper Co., Bingham, Utah, is enjoying a short vacation in Idaho.

Walter Gleason, superintendent of the Cone Butte Mining Co., Lewistown, Mont., was in Denver, Colo., recently.

Robert Linton has completed an examination of mining properties in Mexico and has returned to New York city.

W. E. Defty, mining engineer, Phoenix, Ariz., recently completed mine examinations in Mexico and Colorado.

H. F. Watts, superintendent of the Gold Circle Mining Co., Gold Circle, Nev., was a recent visitor in Salt Lake, Utah.

John Steier of Oshkosh, Wis., manager of the Couer d'Alene Vulcan Mining Co., Wallace, Idaho, was at the property of the company recently.

L. A. Friedman, general manager of the Seven Troughs Mining Co., Vernon, Nev., was in Salt Lake, Utah, recently on company business.

Isaac Jennings, manager of the Ely Ruby Hill Mining Co., has assumed the management of operations on the company's property near Ely, Nev.

Carney Hartley, mining engineer, Denver, Colo., was in Buffalo, N. Y., recently on business connected with a large placer property owned by parties there.

Douglas W. Jessup, a recent graduate of the Columbia School of Mines, has accepted the position of assayer at the Jordan Telegraph mine at Bingham, Utah.

W. L. Cole, manager Mountain Copper Co., Martinez and Keswick, Cal., has returned to San Francisco after a tour of the principal smelting plants of the west.

William Y. Williams, consulting engineer for the Granby Cons. Co., is in the Similkameen district, British Columbia, looking over the property of the company.

Arthur Lucien Walker has been appointed as the administrative head of the department of metallurgy in the schools of engineering at Columbia university. Prof. Walker has patented a number of improvements in apparatus for

casting copper and in the arrangement for the electrolytic refining of the metal.

James P. Harvey, manager of the La Magistral mine, near Ameca, Jalisco, Mexico, has returned to the property after a several weeks' vacation in California.

James Humes, formerly with the North Butte Co., but now operating on Vancouver Island, B. C., is in Philadelphia in the interest of his King Solomon Copper property.

C. Henry Thompson, of Thompson & Gilliam, mining engineers, Los Angeles, Cal., is at the Boca de Cobre mine, near Torreon, Mex., where he is superintending some important changes.

George Mitchell has been appointed general manager of the Clara Cons. Gold & Copper Co., a consolidation of a number of companies operating in the Santa Maria district, Yuma county, Arizona.

Chas. J. Bandman, formerly a member of the firm of Bandman & Adams which was dissolved recently, retains the offices of the company at 225 and 25 Monadnock building, San Francisco, Cal.

H. S. Washington of Washington & Lewis, mining geologists, New York city, has sailed for South America, where he will be engaged for several months examining gold mining properties in Brazil.

Percy Andrus Babb, consulting mining and metallurgical engineer, Mexico City, Mex., recently visited the property of the Mexico Mines-Prospects Development Co., in the state of Jalisco, Mex., of which he is consulting engineer.

### Technical Schools and Societies.

**The Couer d'Alene Mine Makers' Association.**—The constitution and by-laws of the association have been issued. The object and purposes for which this association is formed are to assist in the exploitation of the mineral resources of the Couer d'Alene mining district extending over a part of Idaho and Montana and to truthfully represent existing conditions, eliminating as far as possible "wildcatting," the intermingling of false and misleading representations and for the general protection of both the investor and the miner.

**American Chemical Society.**—An important step in the development of engineering chemistry in this country was taken at the recent New Haven meeting of the society by the organization of a Division of Industrial Chemists and Chemical Engineers. Arthur D. Little, of Boston, was elected chairman of the division and vice president of the society, and indicated in his address the broad field awaiting development by the new organization. The division will include a large proportion of the membership of the society and especially those engineering chemists whose work is directly concerned with industrial development and progress. The division will begin the publication at an early day of the Journal of Industrial and Engineering Chemistry, for which a strong board of editors was elected.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ARIZONA.

Bisbee.

The importance of the Hoatson and Cole shafts of the Superior & Pittsburg Co. is likely to be exceeded by that of the Junction. At the Hoatson 40 ft. of high-grade ore has been penetrated on the 1,300 level in the Del Norte claim, and the outlook is very favorable for a much greater amount of ore in this valuable claim. This claim adjoins the Galena of the Copper Queen Co., on which the Lowell shaft is located. The 1,300 level of the Junction is showing up extremely well, all the workings being in ore. The last samples from crosscut No. 23 on this level averaged 19% copper, the best average yet attained from this level. This crosscut is the richest working in the mine. This week work was resumed on the 1,400 level in drifts 1 and 2, after a week's delay on account of the large amount of water. A streak of sulphides has appeared in the breast of No. 2 drift with good indications of larger quantities of the ore. The face of No. 1 is in leached material. Work has been begun on the 1,500-ft. station, six or eight carloads of ore being shipped daily from the Cole shaft, from which the Pittsburg & Duluth property is being worked by means of a tunnel connecting the two mines.

The Superior & Pittsburg properties are at present shipping about 100 carloads of ore to the Calumet & Arizona smelter at Douglas weekly, and the shipments are likely to be increased as soon as the smelter is enlarged to accommodate the ore.

In almost every mine of the Copper Queen Co. work is being done towards the widening of drifts to permit the operation of electric trains to haul ore to the Sacramento shaft. Only one of the two skips are used to raise the ore on account of there being only one ore bin completed on the 1,200-ft. station, from which the ore is raised. This ore is being shipped to Douglas daily.

The strike made by Buford & Myers in the Paradise district is reported to be increasing in importance with sinking. The shaft has been timbered to a depth of 14 ft. on account of soft ground. A small cave was encountered, in the bottom of which a rich pocket of ore was found. It is the intention of the owners to make shipments to the smelter. The property is adjacent to the Black Queen group on Silver creek.

Prospectors in the Santa Rita mountains in the Patagonia district have cut a ledge at the American Boy that is 25 ft. wide at a depth of not more than 125 ft. Along the ledge where the tunnel first cut the ledge is a streak of black oxide of copper imbedded in talc. Through the rest of the ledge are streaks of mineralized talc, mud and quartz, the quartz carrying iron and copper sulphides and values in silver. Considerable water was encountered which occasioned some trouble. Drifting on the foot wall will

now be done and the high-grade ore sacked for shipment.

Globe.

A great change has been noted recently in the character of the ore being taken from the Sauvage-Guthrie mine. The quartz taken from the cropping contained no copper and was filled with free gold, some of the sack assaying very high. The ore coming from the bottom of the shaft, 30 ft. in depth, is a dark brown carbonate mined with malachite, carrying gold and silver. The shaft has been in ore all the way down, which is continuing as good as when first struck. At present depth the vein is dipping to the north at an angle of about 60 degrees, which indicates a vein of good size. The shaft is being well timbered with a view to sinking to considerable depth. At present hoisting is being done with a whim which will answer until the shaft reaches a depth of 100 ft. or more, when either a gasoline or steam engine will be installed. John A. Guthrie, who owns an interest in the property, and has charge of much of its supervision and development, has determined to thoroughly explore the vein and equip the mine with machinery. Mr. Guthrie expects to raise money and organize a company to open the entire group of six claims.

The Miami Co. is continuing development with satisfactory results. The drifts and crosscuts are being extended in the ore body, the limits of which are not yet in sight. It is stated that the capacity of the company's mill will be doubled. It is rumored that the contract has been let for grading the bed for the seven miles of railroad from Globe to the company's property and that work is soon to begin.

Satisfactory development work is continuing on the Montgomery mine of the Warrior Copper Co. The No. 4 winze has reached a depth of 133 ft. The crosscut at 50 ft. in this winze is still in high-grade ore. Preparations have been made for crosscutting the ore body at the depth of 128 ft. Constant development work is also being done on the upper level. A new steam plant is being installed. The working force remains at about the same as during the past several weeks, but it is the intention of Superintendent White to materially increase this number in the very near future. Regular shipments of ore to the extent of approximately 50 tons daily are made. An office and modern blacksmith shop and other buildings have been built and a new mine office will also be erected.

Phoenix.

Julius Mureil and Walter Fleming have bought of Tom Carrigan an interest in a group of 11 claims situated in Cunningham pass, Yuma county, for \$10,000 cash and 150,000 shares in the new company, not yet completely organized, that is to take over the claims. Twenty men are at work on the principal mine. From one

claim in the group two tons of ore was recently shipped that went high in gold.

A very thorough test has just been completed of ores in the properties of the Verde River Copper Co., situated in the Black Hills district, Yavapai county. The management is satisfied with the results of the tests and it is probable that extensive development work will be done, as laid out by General Manager Pfau and Assistant Manager Sam Leonard.

Prescott.

A rich strike of gold ore is reported from the Tom and Dick claims of the Junita Co. Besides gold, there is some silver and copper. The find was made in a 170-ft. drift from bottom of 110-ft. shaft. At that point the ore body has a known width of over 7 ft. It is considered one of the richest finds ever made in the Crook Canyon district. The Junita holdings comprise 11 claims located 1½ miles south of Palace station. The Junita Co. is composed entirely of Phoenix people. D. A. Seaman of the Seaman-Treadwell Co. is president.

## CALIFORNIA.

San Diego.

During the last year more interest and activity has been manifested in San Diego county, in the prospecting of certain districts, known to be well mineralized and in the development of prospects and properties, than for many years.

The Pala Chief group of eight claims, located at Pala, 12 miles from Temecula on the Santa Fe railroad, was discovered and located in March, 1903, by Bernard Hariart, Pedro Teilich, John A. Giddens and Frank A. Salmon. The second day after location tourmalines were found in paying quantities. It was here that the lilac colored stone, kunzite, was discovered. The ledge of the Pala group outcrops distinctly for 1,400 ft. The width and depth have never been ascertained. The deepest shaft is 14 ft. and all other work consists of open cuts. The Pala Chief mines besides having produced several hundred pounds of kunzite in the last five years have also produced some of the largest and finest tourmalines in the world.

The Dulzura district of San Diego county, the center of which is about 35 miles southeast of the city of San Diego, covers a mountainous area more than 10 miles in length by from three to five miles in width, covered with a heavy growth of brush. The ores generally carry gold values and undoubtedly will readily yield themselves to amalgamation and cyaniding. The preliminary survey of the San Diego & Arizona railroad has been carried through Dulzura to a point about eight miles north and should this route be adopted and the road built, this, along with the completion this year of the aqueduct and pipe line that passes through the heart of the district, a great impetus will be given to mining not only in the

Dulzura district but to other localities as well.

The Donohue property was extensively developed by tunnels and some 15 years ago a Lane slow-speed mill was installed capable of treating about 30 tons per day. The property was closed down in 1904 and has remained idle until recently. It has recently been taken over under lease and the new lessees have sunk a 75-ft. shaft and are crosscutting on what appears to be a more promising shoot of ore than was encountered in the tunnel. The ledges are wide, and the ore a free-milling quartz turning to sulphides with depth. Values average about \$15 to the ton.

The Buckhorn Mining Co. owns in the Dulzura a group of seven claims being developed under the direction of F. R. Macpherson. This property is a tunneling proposition. The ledges are from 6 to 20 ft. wide at the surface, although the pay ore seems to be confined to 1 to 3 ft. on either hanging or foot wall. The main tunnel, for prospecting, is being driven into the mountain between two well-defined ledges outcropping at the surface. At a certain point crosscutting to both ledges will be done. In less than 50 ft. in many stringers of rich quartz porphyry have been met, evidently leading to the main ledge. Assay values from the ores of the ledges and stringers run from \$2.40 to \$12.80 to the ton. Outcroppings from four of the claims give sample assays of \$4.31 to \$10 to the ton. The officers of the company are: W. J. Stoneham, president; Nell F. Brown, vice-president; Harry F. Lamb, secretary and treasurer.

The most active development is going on near the central portion of the district, known as Fiddler's gulch, where are two groups of claims owned by the Dulzura Gold Mining Co., of which Dr. A. J. Elliott is San Diego is president. The ledges are generally 20 ft. in width and in a granite formation near extensive porphyry dikes. The ore is a bluish quartz, with iron, probably to be treated by cyaniding after amalgamation. Assay values from the Golden Rod claim run from \$6.39 to \$12.80 to the ton and about the same from the 20 level of the Darry, a parallel claim. The company will do extensive development work. The officers of the company are: Dr. Albert J. Elliott, president; John A. Sargent, vice-president; Clarence T. Abbott, secretary. J. B. Willey is superintendent.

About one-half mile from the Dulzura Mining Co.'s group are located a number of promising claims known as the Wounded Deer group and belonging to C. Stoniesfer, P. Becker, John Hedgrington and Thomas Coats of San Diego. Assays of the ores vary from \$5 to \$40 to the ton. The same people are interested in another group on Cottonwood creek. Development is progressing under direction of John Hedgrington.

In Fiddler's gulch some Mexicans are opening up several promising claims with ledges about 4 ft. in width. The ore is white quartz showing a tendency to sulphides at no great depth.

About eight miles north and east of the Dulzura post office is located the property

of the Barber Mountain Mining & Development Co. There are several parallel ledges on this property, all of which can easily be encountered by crosscutting from the main tunnel being driven on the main ledge. On one ledge is a 40-ft. shaft in ore all the way down, giving values of \$3 to \$8 to the ton in gold, although better assays at other points have been obtained. Excellent development work is being performed on the property under the direction of Joseph Walsh, one of the original locators. Principal offices of the company are at San Diego. W. E. Kitzman of San Diego is president.

Eleven miles southwest of Julian, four miles from the old Stonewall mine, out in the Boulder Creek district, is the property of the Boulder Creek Cons. Mining & Milling Co., consisting of the Boulder group of three claims, the Pandora group of two claims and the Little Giant group of three claims, all close together. On the Little Giant group is probably 1,100 ft. of development, a 10-ton mill with full accessories and several hundred tons of good ore, not free-milling, on the dumps. The ledges are wide iron croppings and a quartz ore showing sulphides in many places. On the Pandora group is an 85-ft. shaft in ore showing good gold values, an 85-ft. crosscut and another shaft 45 ft. deep. The Boulder group is opened up by one shaft 54 ft. deep and an 85-ft. crosscut tunnel showing rich stringers of gold-bearing quartz. Several other claims are opened up by tunnels and shafts. The milling plant consists of a 7-ft. Lane slow-speed mill with a capacity of 5 tons per hour, amalgamating plates, a No. 2 Standard concentrator, 20-hp. West Coast gasoline engine, an 8-hp. Hercules engine, Dodge crusher, a triple-action force pump and 2,500-gal. tank. Sufficient power can be obtained from Punchbowl falls for mill purposes up to 50 tons per day, for elevators, agitators in leaching plant, for operating electric drills, air compressors, hoists, lighting above and under ground and all other power and light requirements of camp with reserve force of water to spare. The values in the several veins of the properties are from \$12 to \$25 to the ton. The average value of the ore by amalgamation, concentration and cyanidation is probably between \$15 and \$20 to the ton in gold. The officers of the company are: J. H. Klein of Lakeside, president; Geo. H. Moyer, vice-president; L. M. Corwin of San Diego, secretary; Colonel L. C. Dana of San Diego, treasurer. T. H. Thedginge is general manager at the mines.

The Stonewall mine, which in the past has produced from \$2,000,000 to \$3,000,000, was taken over about five years ago by E. B. Tustin of Bloomshurg, Pa., who has recently organized the San Diego Gold Mines & Development Co., and will, it is thought, rehabilitate the property and work it on a large scale.

#### Escondido.

The Escondido district, San Diego county, embraces an area 25 miles square. During the last 6 months much development work has been done on various properties and the district is now one of the recognized mining centers of south-

ern California. The general formation is granitic with large porphyry dikes and ledges of quartzite. Along the contacts are ledges carrying values in gold, silver, copper and lead. No systematic attempt at development has been made until recently to prove the values of properties.

A. J. Waidman has made an investigation of the entire district and has purchased the Mason group of three claims near the Buckhorn property and will at once begin active development.

Peter Kroecker of Pueblo, Colo., has purchased and will develop two claims just east of the Donohue property.

The Yellow Metal mine at Banner, in the Julian district, has been sold to Gibbons brothers of Reno, Nev., who are installing a 6-drill compressor plant and will also equip the mine with a modern mill. The Yellow Metal mine is developed to a depth of 500 ft. and has a big record of production. Fairbanks, Morse & Co. are putting in the improvements in machinery.

The Butte Peak Mining Co.'s property, seven miles east of the city, on the eastern slope of Escondido mountain, includes eight claims and three mill sites. The development consists of a 60-ft. shaft, two tunnels, one in 150 ft., and 200 ft. of drifts. The ledges are from 2 to 15 ft. in width and are well mineralized, although no high assays have been had. The ore appears to be adapted to an amalgamation and cyaniding process. Colonel W. H. Wilson is general manager and under his direction the property will be systematically developed.

Six miles north and east of the Butte Peak is the Surprise mine. The ore found in the Surprise carries gold, silver, lead and zinc. About 200 ft. of development work has been done.

The Cleveland-Pacific property is three miles from Escondido at the branch terminus of the Santa Fe railroad. Since January 1 the 5-stamp mill has been thoroughly overhauled and a 25-hp. gasoline engine and a 16-hp. gasoline hoist have been installed. From the Bieber shaft, 100 tons of ore recently milled returned \$20 to the ton. The company contemplates the sinking of the 100-ft. Grace shaft to a depth of 900 ft., the building of a tramway for moving the milling ore, the installation of settling tanks near the mill, the sinking of all the shafts and also the adding of five more stamps. Quite a number of leasers are doing good work on the property.

The Oro Fino, the second mine of importance in the district, is north of the Cleveland-Pacific, on the same ledge, and covers about 100 acres. The property has produced a large amount of bullion. It is equipped with a 5-stamp mill and concentrator. Tailings from the mine are now being cyanided at the Cleveland-Pacific plant.

North of the Oro Fino mine is the Anderson-Casson, in which 200 ft. of development work has been done. The ledge, which is the same as is on the Oro Fino and Cleveland-Pacific, shows high-grade, free-milling ore.

Five miles west of Escondido, in Crescent valley, large bodies of low-grade ore, carrying gold and silver values and of a

character that can be worked upon the ground, have been discovered.

The San Fernando mines, up the valley, have ample water for all milling purposes.

The Escondido Mine Development Co. has recently been organized by Escondido men and several properties have been secured on which work has been pushed as fast as possible.

In the Grape Vine district, about 75 miles northeast of Foster, the terminus of the San Diego, Cuyamaca & Eastern railroad, the Colorado Mining & Milling Co. owns two groups of five claims each. The Dewey ledge courses through the property for 7,500 ft., trending northwest and southeast. The average value of the ore down to a depth of 60 ft. is \$21.10 to the ton. A main tunnel is being driven to cut the ledge 300 ft. below the surface. In one portion of the tunnel an unknown vein was encountered, which gave assay values of from \$5 to \$17 to the ton in gold. The officers of the company are: Benton Canon, president; Captain W. R. Farnsworth, vice-president; J. P. McClurken, secretary-treasurer. Jas. L. Patterson is general manager.

#### MISCELLANEOUS CAMPS.

J. J. Donovan, superintendent of the Whipple Mountain Gold Mining Co., operating in the Eastern portion of San Bernardino county, states that a rich vein of ore has been encountered in a south-croset. The workings are in a solid body of quartz 20 ft. in width, a most promising showing and proving the permanency of the mine.

About a mile away on the same vein the Brownell Co. has let a contract to sink a big shaft.

The National Copper Co. in the same district is putting up new buildings and has arranged to ship ore.

The dry washer process is meeting with considerable success, operating in the dry sands of the Twenty Nine Palms district, San Bernardino county, where some important free-gold strikes were recently made.

## COLORADO.

Denver.

A. J. Halter of Copperfield reports the opening of a remarkably rich gold field, about 1½ miles west of the copper belt. Assays from grass roots are said to run into the hundreds, all available ground is being staked and prospectors from all parts of the state and elsewhere are coming in. The known extent of this new find is about two miles long by four miles in width. It is 37 miles from Cripple Creek in a direct line. Mr. Halter, who is interested in this new find, reports great activity. Bond and lease have recently been made to eastern people, who will soon begin the erection of a plant for the treatment of their ores.

The new plant of machinery installed on the Queen-Princess is now in perfect working order. The entire work was under the direct supervision of John B. Stephen of Colorado City, president of the company, assisted by J. A. Conboy of Florissant. It is now proposed to push the work of development of the

property with all the speed possible, the contract for sinking 200 additional feet in the main shaft having been let to Messrs. Williamson & Bennett, who are working a full force of men on the contract and whose first 10 ft. of sinking showed a material and most satisfactory change in the formation, quantities of copper glance being hoisted to the surface.

The Columbia Gold Mining & Milling Co., composed of Elmira, New York, people, is heavily interested in the Bellevue-Hudson mine at Empire. The company has an ore body 7 ins. in width, which averages over \$80 to the ton. W. W. Monat of Denver is general manager.

In the western portion of Routt county is located the Douglass mining district. Across the Bear river on the south lies the Blue Mountain district. H. J. Coulter is interested in several large properties, among which is the Douglas Mountain group, consisting of 14 claims. A large tunnel site is being worked, which will crosscut a number of veins at a great depth.

Mining affairs in Boulder county show material improvement. Much work is being done and some new plants of machinery will soon be ordered.

The Concord mine is producing some extremely rich ore.

The shaft of the Dolly Varden mine at Sunset shows 15 to 16 ins. of auriferous sulphide, which assays \$65 to \$70 to the ton in gold.

A. McClelland has returns from a recent shipment of 1,700 lbs. taken from a block of ground at the 1,000 level of the Slide mine, owned by Senator Teller. The values were exceptionally high. The richest ore is now coming from the lowest levels.

The司空'Gold Mining Co. is arranging for a machinery plant to deepen the shaft another 100 ft. The property lies in the richly mineralized section of Sugar Loaf district. J. M. Miller of Chicago is the secretary and manager of the company.

E. H. Wagner of St. Louis, who with other residents of that city is interested in the Ginges Khan, is preparing to reopen that property, which has been idle for 14 years. The plans include extensive development and the building of a cyanide mill.

There is every indication of a revival in Nederland tungsten district. If the plans of the mine and mill owners are carried out upwards of 500 men will again be employed.

The Wolf Tongue mill has again begun to fill its ore bins and the Boulder county mill at Cardinal is again in full operation.

It is reported on very good authority that a party of German investors is on the way to Boulder with engineers and is said to have well perfected plans for handling the major part of the tungsten output, including control of the principal mills.

Manager Burke is getting affairs in shape to commence taking out ore early next month. The west ore shoot will be opened up from the tunnel level to ascertain its extent and values above.

Drifting on the great ore shoot which was cut from the tunnel level of the Altout at Cardinal on the Little Jim vein,

has now covered 115 ft., and with the exception of about 14 ft., shows high-grade ore the entire length of the drift. Drifting on the Little Jim vein to the east is making good progress and indications are good for getting good ore at this point.

Idaho Springs.

Roller, Shaffer and associates are still conducting experiments in milling the very low-grade products of the Alice mine in Upper Fall River district with very good results.

The Sun and Moon mine, like the Gem and several of the larger mines, now has a complete telephone service throughout its workings. Seventeen 'phones connect the various levels and stations.

The Jackson mill is congested with Sun and Moon ore, there being 600 tons on hand with daily receipts of two carloads from the big raise and two wagon loads from the upper workings. The streak in the raise is 5 ft. wide.

An examination of the Jefferson-Calhoun property in Gilpin county, recently completed, shows that a continuous ore body has been blocked out 1,100 ft. in length, commencing at the East Callhorn and running west to the Jefferson-Calhoun. This development indicates a block of ground with an average ore body 500 ft. in depth by 1,100 ft. in length. The company is considering the running of a lateral from the Newhouse tunnel west about 2,000 ft., all in its own ground, which will give a large area, fully drained, well ventilated and easily reached, to an average depth of 1,650 ft. at the lowest point and about 1,700 ft. vertical. It is one of the best arranged combinations in the county for large and profitable production. Electric power is to be added to the already fine machinery equipment.

Leadville.

The old Forest Queen shaft on Breese hill is being dismantled and the mine is now being operated through the Yak tunnel.

There is a fair prospect that the iron-silver mines will be reopened. The Tucson is the only mine owned by the company that is being worked. The improvements on the Moyer shaft are completed and the property is drained. Electric power has been installed. The large property is in excellent condition and the only thing that has delayed resumption is the low price of metals.

Lessees on the Champion at Red Cliff continue getting good returns. Following the discovery of a large ore body that gave high values, a fine streak of smelting ore was found.

G. M. Marshall, president of the First National bank of Belvedere, Ill., is also president of the Belvedere-Leadville Mining Co., which is opening up the Damless and adjoining mines in Horseshoe district. In sinking an experimental shaft a 5-ft. vein was opened that will pay good profits. From 2 to 3 ft. of the mineral thus exposed comes 40% lead and 25 ozs. silver to the ton. Mr. Marshall has ordered contracts for surface buildings and in the spring a stamp mill will be built.

George Crawford, general manager of the Red Mountain Railway, Mining & Smelting Co. at Red Mountain, Ouray

county, has employed a number of men in putting the various plants in readiness for active work. As soon as the mines are under way a large force of men will be employed. He has raised money to pay all indebtedness and to furnish working capital.

Geologist J. E. Spurr has been making another survey of the Camp Bird mine at Ouray. The result of his examination will determine whether or not the Camp Bird people will acquire more property to the west.

Excavations have been begun for the pyrite smelter on the Saratoga near Iron-ton. In a short time the machinery will be on the site and work on construction commenced.

Edward McIntyre has reopened the old shaft of the Trout and Fisherman group in Box Canyon park. As soon as practicable he will install a pump of large capacity.

#### Cripple Creek.

The Boston owners of the Chesapeake, Daisy and Golden Hibb are about to resume work. The Chesapeake adjoins the Portland and Independence and has been idle for years. The Daisy near the Isabella on the slope of Bull hill has a large amount of mill stuff already opened up and it is understood that if no arrangement for treating it at the Isabella mill can be made the company will build a cyanide plant of its own.

The lessees of the Lucky Gus No. 2 shipped a car of ore this week that gave returns of \$151.20 per ton. The gross bullion value of 30 tons was \$4,536. This is said to be the most profitable lease in the district.

Morris brothers of Cameron, operating on the Morning Star of the Acacia, have entered a rich ore shoot at the 450 level. The screenings are averaging better than 200 to the ton. The vein is 5 ft. wide.

About 1,500 tons has been shipped from the Findley on Bull hill this month that averaged 1 oz. to the ton.

An important disclosure has been made in the Roxana property on the west slope of Raven hill. A flat vein was discovered at a depth of 20 ft. from the surface in the Mountain Monarch. It is from 3 to 4 ft. thick and assays gave 3 to 5 ozs. of gold to the ton.

The new Portland cyanide mill is in course of construction and it is expected to be ready for the installation of machinery, which is all on the ground, in the course of two or three weeks. It will have a capacity of 500 tons per day.

Since the first of August 20 sets of lessees have been operating on the holdings of the Granite Gold Mining Co., comprising the Dillon, Monument, Granite and Gold Coin properties and are shipping at the rate of 75 cars per month.

#### IDAHO.

##### Wallace.

The Lucky Calumet Mining Co. is now sinking a winze on a thin streak of galena encountered in the drift west from the main cross cut. Although small, the streak is thought to lead downward to the ore shoot which has been sought.

Work is progressing satisfactorily on the drift.

The Black Horse Mining Co. has been organized here by Joe Thiennes of Spokane, Wash., Patrick Burke of Mullan and F. D. Allen of Spokane, with a capital of \$1,000,000, to work the well known Black Horse group of claims.

The last car of concentrates sent from the Stanley mine gives a net return of \$5,600. There will be no more concentrates for shipment till operations at the mine are begun, equipped with a mill on the ground, as the rehandling of the ore incident to reduction at the New Jersey mill was too expensive, and the amalgamation form of treatment has been found poorly adapted to the Stanley ore, which is gold-antimony. The mill will probably be built within the next 60 days.

The Montana Standard Mining Co. has decided to run a long tunnel, and expects to erect a mill next year if the tunnel develops a good ore body.

Galena is reported from recent work at the Clear Grit. The vein is being worked through the center and shows much mineral.

A streak of galena 10 ins. wide has been encountered in the property of the I. C. Mining Co. in a vein 20 ft. wide. Drifting is now in progress.

Ten feet a day is being made in the tunnel being run on the Amazon-Dixie property near Lookout. Machine drills are being used and a crew of 14 men is employed.

Work has been resumed at the Panhandle property and several carloads of ore are now on the dump. The ore runs well up in lead.

Copper and silver ore has been encountered, it is reported, in the Silver Crown mine near Osborne in a 200-ft. drift.

The Amalgamated Stock Holding Co. has been organized at Wallace to take over a group of six claims located on Pine creek, where it is said a good showing in galena has been made. J. H. Tilsley of Spokane, H. C. Topping of Wallace and others are the incorporators.

The incline shaft being sunk on the Florence property near Wardner is progressing favorably. It is thought the shaft will strike the same ore body struck several years ago in the Butler, which ran up to several hundred ounces in silver.

Good showings in galena are reported from the Enterprise near Kellogg. The vein is about 9 ft. wide with half of that carrying concentrating ore. There has been a large amount of development.

The Idora Mining Co. has paid off the last installment of its mortgage and operations at the mine will be resumed. Drifting and development work will proceed simultaneously. President Frank Johnson states that the work this fall will be done by hand, but that next spring machine drills will be put in and the property developed more extensively.

A crosscut on the Capitol Mining Co.'s property near Osborne has been started, which will tap ore at 500 ft. below the present lowest workings. Much development underground has been done.

##### Elk City.

The 5-stamp mill formerly on the

Union mine has been transferred to the South Fork mine, where it is now being installed and where preparations are being made to break ground.

J. M. Eakin has discovered valuable placer deposits on his farm land and is now developing them as mining property.

The Hogan property is being worked steadily and is turning out \$230 in gold a day. The 20-stamp mill is being worked two shifts. The plant will be doubled in capacity and machinery is being ordered from Portland, Ore.

It is reported that another discovery of rich gold-bearing quartz has been made on the Snowstorm mine.

The Buster is being worked night and day and the shaft is being sunk as rapidly as possible. It is expected that a power plant will be installed next year if the showing at the 400 level is sufficient.

The Black Diamond claim has been paid for in full by Richard Kleesattel, who held a bond on the property. It is being worked with a small crew.

Jacob Schlosser, president of the Untilla Mining Co., states that development will probably justify the installation of a plant next spring. The property has been developed at a great expense, due principally to a long tunnel which is being run. It is stated that ore has recently been encountered in the tunnel.

#### Sandpoint.

The MacNickolas-Watts Co., which has been buying up mining properties around Lake Pend d'Oreille, has purchased 12 more claims near Garfield bay. It is said the company has invested \$200,000 in this district and will have a considerable amount of ore for shipment in a short time.

J. C. Hague of Spokane, Wash., is incorporating a company to handle a group of claims he has been developing for several years on Treble creek. Headquarters will be at Sandpoint.

#### INDIANA.

##### Indianapolis.

The increasing demand for coal is the means of bringing about normal conditions in the mines and affording work to about 3,000 miners who have been idle for the greater portion of the summer. Operators say the demand for steam coal has doubled during the past week and this is understood to mean renewed activity in the manufacturing industries of the country. The return to their work of the 10,000 miners in the bituminous field after a strike of several weeks is a gratification to both miners and operators. Within two weeks it is expected that all of the mines in the state will be in operation to their fullest capacity.

A fire which broke out Aug. 12 in one of the leads in the Union mine, near Sul-Evan, has continued to spread, despite all efforts to check it. The fire has already proven one of the most serious mine fires that has occurred in the state, and the operators cannot tell when it will be checked.

John K. Seifert of Terre Haute, general superintendent of the mines of the

Indiana Southern Coal Co. and the Southern Indiana Coal Co., has been appointed receiver for both companies by Judge Baker of the Federal circuit court. The complaint and application was made by the First Trust & Savings Bank of Chicago, trustees for the bond holders. The action was brought in Indiana, as all the properties of the coal companies are in this state and consist of about a dozen mines located along the line of the Southern Indiana railroad, which was also placed in the hands of a receiver recently. The coal business in this territory has suffered such a slump in the last year that the company could not meet certain fixed charges, interest, etc.

The Operators' Coal Co. of Marion has filed articles of incorporation with the secretary of state. The company proposes to do a mining business in this and other states.

## LAKE SUPERIOR.

### COPPER.

Houghton, Mich.

Exploration work at the Keweenaw has been practically discontinued and engines directed to breaking rock for mill shipment or in putting the openings in shape for enlarged shipment, while the stamp mill test is going on. About half of the rock now being shipped is coming from underground and half from the stock piles. The daily shipments now amount to about 250 tons. The property is now well opened up, so that the test will give fair results of what may be expected in the future. No section of the dump rock is being made, and the management seems to prefer to make a poorer showing now than later. Practically the entire lode is being shipped.

A second electric pump has been installed in the Baltic mine of the Copper Range Cons. The work of enlarging the electrical equipment is proceeding slowly. It is not likely that work will be resumed on the permanent electrical station at West Houghton before next year, as there is no special need for additional current at the present time.

It is expected that the lode will be cut from the second surface hole on the Adventure at any time. If the lode is struck and proves to be mineralized as richly as that pierced from No. 3 shaft, steps will be taken to proceed at once with its development.

Preparations are being made on the Wyandott for diamond-drill explorations in search of the Lake lode. The sand pipe is being driven to bed rock which, it is believed, will be reached within 100 ft. Drilling will be done about 500 ft. in the hanging wall of a copper-bearing amygdaloid on top of what is believed to be the No. 5 conglomerate, which is thought to lie in the foot wall of the Lake lode. It is estimated that the drill will enter the lode in from 300 to 600 ft. The average rate of drilling will probably be between 10 and 20 ft. per day. Crosscutting to reach the same lode is also being prosecuted from a vertical shaft 700 ft. deep. It is estimated that the crosscut will reach the lode in a dis-

tance of 750 ft. from the shaft. On Aug. 1 it was in 98 ft. and was progressing at the rate of 80 ft. per month.

### IRON.

Mining affairs are appreciably better than at the beginning of August. Shipments have enlarged somewhat and a number of mines heretofore all but idle have been restored to practically their normal activity.

On the Marquette range industrial conditions are better than at any previous time this year. The tonnage sent out is increasing. Both at the Hartford and the Queen Mines the stockpiles will be entirely cleared away this season. It is significant of the conditions to note that there are very few, if any, idle miners in the district.

The Breitung interests of Marquette, which operate the Breitung Hematite and Mary Charlotte mines at Negaunee and the Baron at Humboldt, have recently made important sales of ore, as a result of which they have increased their working forces to the extent of almost 300 men. The greater number of these have been taken on at the Mary Charlotte, and this property is now employing both day and night shifts. Both it and its neighbor, the Breitung Hematite, will retain the increased working forces throughout the winter and perhaps permanently.

The Baron mine, west of Ishpeming, is opening up very satisfactorily. The ore is of good quality and it works well in the smelting process, a number of sample consignments sent out lately having come fully up to expectations when tested in furnace stacks. Twenty-five additional men have now been employed and more will be taken on when the ore crushing plant is completed and ready for duty, until which time little mining will be done.

The American mine, which lies in the territory to the west of Ishpeming, is developing steadily and is gaining in importance with the opening of each level. The property is in the hands of the Hanna interests of Cleveland. Shipments are being made. A new steam pump has been installed on the bottom level.

Ore is being shipped from the stockpile at the Lucy mine at Negaunee to the Gladstone furnace of the Cleveland Cliffs Iron Co. It is the first ore taken from the property in a number of years. At its Cliffs Shafts mine at Ishpeming the company is preparing to equip the battery of five big boilers with mechanical stokers, fuel economizers and induced drafts, together with machinery for automatically handling the coal and ashes.

The Sheridan mine in the Iron River district has been taken over by J. E. Sutton, who is understood to be the representative of English interests. Exploratory and development work will be started shortly. The Sheridan was formerly known as the Stegmiller. It adjoins the Riverton and lies in the village of Iron River. It has shipped 120,000 tons of ore, the last of which went out in 1900. The Sheridan has one shaft down upwards of 300 ft. and when last operated by Pickands, Mather & Co. a 30-ft. vein

was being mined. The ore is of non-Bessemer grade.

Oglebay, Norton & Co., who a short time ago resumed work at the Chatham properties at Iron River, have now put the big Bristol mine at Crystal Falls, Menominee range, in commission again. The Bristol has been idle for four months, and because only 25,000 tons of ore had been shipped from the stockpile, it was feared there would be no resumption of operations this season. It is understood, however, that good-sized sales have now been made. A force of 150 men is being taken on. The Florence Iron Co. is working double shift at its mine at Florence and has increased its force to 150 men. Present shipments are at the rate of 600 tons daily.

A new shipper on the Mesaba next year will be the property the development of which Tod, Stambaugh & Co. of Cleveland are starting in Section 11, 57-21, two miles southwest of Hibbing. The mine will be an underground proposition, the overburden being of unusual depth, and it will be opened by a concrete shaft, the contract for sinking which has been given the Foundation Co. of New York. The tract consists of 80 acres. It is owned by the estate, and is understood to contain a considerable body of Bessemer ore.

Other new producers on the Mesabi will be M. A. Hanna & Co.'s Silver property at Virginia and Hanna, near Mountain Iron. Both will be open pits, and both are now in progress of development. One shovel is engaged in stripping at the Hanna and two at the Silver. The two latter are being operated day and night and the overburden has already been removed from a portion of the ore deposit. A force of almost 400 men is employed.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week ending Aug. 22 and for the year to that date were as follows in pounds:

### LEAD ORE SHIPMENTS

	Week	Jan. 1-
	Aug. 22.	Aug. 22.
Alta-Neck City	188,000	188,000
Aurora	10,020	237,460
Badger-Peacock	10,572	352,492
Carl Junction	.....	181,700
Carthage	.....	6,170
Carve Springs	.....	11,220
Duvernay	20,800	2,932,400
Galena	102,450	4,283,332
Granby	27,000	1,112,806
Joplin	219,900	9,271,200
Miami	.....	925,050
Oronogo	65,360	456,320
Peoria	.....	156,640
Prosperity	112,670	2,900,720
Quinn-Haxley	1,000	617,840
Seneca	.....	156,640
Surfbluff	.....	27,020
Sturgeon-Spring City	186,530	1,312,300
Webb City-Charlton	691,000	21,974,437
Zincite-Sherwood	.....	142,290
Total	1,309,382	50,753,200
Value	\$15,572	\$1,402,881

### ZINC ORE SHIPMENTS

	Week	Jan. 1-
	Aug. 22.	Aug. 22.
Alta-Neck City	127,210	238,910
Aurora	120,720	10,518,450
Badger-Peacock	269,510	14,914,510
Carl Junction	24,020	1,426,490
Carthage	60,440	5,225,770
Carve Springs	.....	300,700
Duvernay	20,800	18,792,770
Galena	369,720	23,385,770
Granby	523,910	14,049,630



	Week Aug. 22	Jan. 1- Aug. 22
Joplin	1,850,840	72,889,897
Miami	269,400	5,253,398
Oronogo	571,840	11,839,520
Pocahontas	12,720	411,660
Prosperity	158,510	10,026,290
Quincy-Luxley	12,180	3,572,110
Reids	112,880	1,715,810
Saville	112,880	2,818,550
Seneca	112,880	34,670
Spring-City	229,480	7,129,280
Stoll City	112,880	182,380
Webb City-Cartersville	1,327,019	55,582,352
Wendover	112,880	321,670
Zachary-Sherwood	112,880	2,373,240
Total	10,891,969	215,012,657
Value	\$191,900	\$5,318,667

Joplin, Mo. Among the operations of interest in the Joplin camp is the sinking of an incline shaft at the Tanagami mine. It is down 200 ft. on the incline, or 105 ft. on the vertical. An average of 19 ft. per week has been maintained while sinking. A rich lead strike was made in sinking a winze in this mine last week. The ore was found at 198 ft.

The Platta Mining Co. is developing a rich lead and zinc deposit at Spring City. Drilling revealed a rich run of ore and a shaft is now down over 100 ft. This development extends the camp to the south, and will add to the productivity of Spring City.

Several drill holes sunk on land near the Henderson mines in Newton county have resulted in some rich finds of lead and zinc from 14 to 35 ft. Four sub-leases have been taken on the ground, and these will be developed at once. The company will erect a concentrating plant.

The third attempt at mining on the Scranton land west of the city has proved successful. Two shafts were first sunk to the 40-ft. level, each encountering hard limestone. The third shaft entered an abandoned mine which had been worked at the 200-ft. level. A drift was run at 72 ft. and rich ore found, which continues to grow better with further work. Six tons of high-grade ore was cleaned from the first 400 "runs" hoisted. A horse hoist and hand jigs are used.

The new 300-ton mill on the ground of the Lucky Jim Mining Co. began operations this week. The ore body at the Lucky Jim is a high-grade zinc-lens. The ground is well opened up.

The Hermit Mining Co., operating in Leadville Hollow, has encountered a body of high-grade zinc and lead after sinking a shaft to 100 ft. A 30-ft. face of the ore is carried. The drift runs 15 to 25% zinc with a considerable percentage of lead. The mill has been overhauled.

Budd M. Robinson has developed his Claycomb mine west of Chitwood sufficiently to warrant the erection of a mill. The ground has been drained in the district to 185 ft. by the constant pumping, making shallow work easy. Over 500 ft. of drifting has been done and much more work will now be undertaken.

The Diamond Jack has resumed operations west of Chitwood. The 150-ton mill is kept in steady operation. Work is being done at 160 ft. The deeper levels will be developed as soon as the present level is worked out.

Webb City, Mo. A milling plant of 200 tons capacity

will be erected on the Criterion lease at Porto Rico. The past year has been given over to extensive development. Two shafts are in ore connected by an air drift, and three working drifts have been run. A 13-ft. face of ore running 4 to 5% lead and zinc is opened up. The company has 4,000 or 5,000 lbs. of lead ore piled up at the mouth of the shaft.

One of the better recent strikes is that of Barr & Co. on the old Trompe farm south of Webb City. A shaft recently entered the ore body at 240 ft., penetrating a 14-ft. face of the ore. The deposit runs from 10 to 12% zinc. A considerable amount of drifting has been done. This is the first company in this portion of the field to succeed in opening the lower runs of ore. A second-hand mill will be moved upon the lease.

The custom mill on the Center Creek Mining Co.'s ground, burned some time ago, has been rebuilt.

The old Monticello mine at Prosperity, apparently worked out, has been the scene of an important strike. The company is taking up an 8-ft. stope, in which the lead content is high. The turnins show 24 to 40 tons of zinc and 10,000 to 15,000 lbs. of lead per week.

Since the advance in the ore market nearly all the plants in the Aurora camp have resumed operations. Over 40 shafts are being sunk.

Alma, Mo. During the sinking of a well at Alma a good body of ore was penetrated. A careful record is being kept of the strata and different formations encountered during sinking. This well will be the deepest in the north end of the camp.

A shaft is being sunk on the Quick Seven lease at Alma where the drill showed good ore from 20 to 150 ft. The shaft is down 80 ft. and has passed through some excellent deposits. A gasoline engine, pump and hoist and hand jigs have been installed. A sub-lease has been taken on the ground and work will be pushed.

The Riverside Mining Co. across the river has sunk the shaft deeper to catch the same run of ore opened up in the Quick Seven. Ore was encountered here at a shallow level on a hillside. The full depth of the deposit reaches 200 ft. A drift was run out at a shallower level.

The shaft being sunk on the Weaver farm southeast of Alma is now 190 ft. deep and good ore has been encountered. Drifts will be run at once and a mill will be built in the near future.

Ardmore, Okla. The Arbuckle Development Co. has been formed here for the purpose of exploration to determine the value of the mineral resources of the Arbuckle mountains. William F. Beard of Ardmore is president and general manager. Mr. Beard recently secured 100 lbs. of ore that tested 15 to 65% of zinc. In silver this ore assays from \$16 to \$60 to the ton. Now that the state geological survey and the United States geological survey have placed investigating parties in the mountain region, it is predicted that the mineral resources of the region will soon be made known.

## MONTANA.

Butte

The North Butte Mining Co. has started crosscutting for the Edith May and Jessie veins from the 2,000 and 2,200 levels of the Speculator. The stations and skip pockets were completed during the past week and the Edith May vein, because of its dip to the south, was cut in one corner of the station at the 2,200 level. The vein has not yet been fully cut through at that point, but the portion opened shows it to be of the same character as it is on the 1,800, where the company has been working.

By the first of the month the repairs on the damaged smelter of the Boston & Montana Co. at Great Falls will be finished and ore shipments will be resumed, but not more than 1,000 tons per day will be added to the present output.

The Pittsburg & Montana Co. has completed its new 300-ton concentrator building and is installing the machinery. The company will soon increase its output, and with the concentrator will be able to work a lower grade of ore.

The Davis-Daly Estates Copper Co. is confining its work to the Colorado shaft, which is being sunk deeper. It is now about 1,200 ft. deep. Ninety ft. of it was sunk in July. No mining is being done, and the only lessees working are a few engaged in the Plymouth and Silver King mines.

The Copper Eagle Mining & Smelting Co., which owns a silver property north of Butte, has resumed operations after a long shut down, funds needed to carry on development work having been raised. The shaft will be sunk 100 ft. additional. A good body of ore has been found on the 250 level.

The stockholders of the Reins Copper Co. have voted to issue \$500,000 in 6%, five-year, first-mortgage bonds. The mortgage will cover the company's property in Butte, including the Combination, Ella and Louise quartz lode claims and all of the equipment. Nearly all of the company's 1,500,000 shares of stock were represented at the meeting. The debts will be paid off with the money derived from the bond sale and a working fund will be provided.

The Raven Mining Co. is sinking a winze on the vein at the 1,100 level. Two veins were crossed on that level and considerable drifting was done on the better of the two. Some encouraging assays were taken all through the vein, but the values were not pay character. The vein will be explored at greater depth through the winze. The shaft is an incline and the 1,100 ft. station has a vertical depth of only about 750 ft.

It is announced that the financial difficulties of the North Butte Extension Co. will be met by the issuance of \$100,000 in 6% bonds, maturing in five years. It is said that some of the large stockholders, presumably President Van Brunt and his associates, are ready to take \$20,000 of the bonds at once, that being the amount to be issued now. The remaining \$80,000 will be retained in the treasury. The Extension Co. owes con-

siderable on unpaid operating expenses, options, etc., but it is said these will soon be paid and operations on the property will be resumed.

Butte men are engaged in exploration work in a new copper district, situated in Jefferson county, 16 miles from Butte and 11 miles southwest of Boulder. The first company to be organized to work there is the President Copper & Gold Mining Co., incorporated under the laws of Montana and capitalized for 1,200,000 shares of the par value of \$1 per share. It is proposed to keep 500,000 shares in the treasury. The company takes over 11 claims located along a vein for a distance of a mile and a half. The vein on the surface is from 30 to 60 ft. wide, and has been explored by two shafts sunk 3,000 ft. apart. One is 210 ft. deep and the other 80 ft. It is claimed that the bottom of the deepest shaft is in commercial ore, assaying well in copper, gold and silver. The officers of the company are Ferdinand Grattan, president; C. S. Shoemaker, vice-president; Walter Talbot, treasurer; Joseph Chauvin, secretary. These and William Creden and H. P. Bennett comprise the board of directors.

The Butte & Superior Co. has about completed a station at the 1,200 level, where a large pump will be installed, after which a crosscut will be driven to the lead.

The Clarks are still sinking on the Elm Orin shaft, which has reached a depth of 1,000 ft., where a station is being cut. Some development work and mining was done on the 700 level, but the ore found was not in a large or continuous body.

#### Boulder.

Satisfactory progress is reported as being made at the properties of the Butte-Wallstreet Mining Co. The group consists of 12 quartz mines in Boomerang gulch, two and one-half miles from Boulder and adjoining the Baltimore properties. A tunnel in 300 ft. is now being driven on the Newport claim. In a short distance farther a depth of 180 ft. will be gained. Ore assaying well in gold, silver and copper has been taken from the Alta, Eureka and other claims of the group. The company is capitalized at 1,200,000 shares at a par value of \$1.

#### Corbin.

The Kelly Smelting & Refining Co. has acquired the Alta group of mines at Corbin. It is said that work will be started on the properties in the near future and development will be carried on on a large scale. It is proposed to erect a 400-ton concentrator, in which improved methods of treatment will be used. It is also planned to sink two 3-compartment shafts to a depth of 1,000 ft. below the old workings to reach the large bodies of rich ore carrying copper and other values that are known to exist in the lower workings. The company also acquires all the water rights and the rights to the total power of the Montana Electric Co. The machinery will be operated electrically. The Kelly Smelting & Refining Co. is incorporated under the laws of Arizona and capitalized at \$1,000,000 with 1,000,000 shares of common stock of par value of \$1.

## NEVADA.

#### Seven Troughs.

Work has been resumed on the Fry-Sandifer lease on the property of the Seven Troughs Therien Mines Co. after a shut down of 30 days. Work was begun at the new shaft down 30 ft. on the Mazuma Hills veins. It is the intention to sink to the 200 level before crosscutting and drifting are started. The hoist at the old shaft will be moved shortly to the new one. But little work will be required to connect the new shaft with the old workings, where encouraging values are appearing in the drift south along the vein.

A test run of 15 tons of ore from the Wihutja Gold Mines Co.'s lease on the estate of the Seven Troughs Therien Mines Co. made at the Kindergarten mill resulted in the production of a bar of bullion valued at \$2,500.

A strike of 18 ins. of very rich shipping ore has been made at a depth of 80 ft. in the face of the tunnel in the Martin and Gourdiere lease on the Mazuma Hills property. The strike was in a parallel vein 600 ft. west of the famous Mazuma Hills vein in entirely new ground, 130 ft. from the portal of the tunnel. Up to the time of this strike the vein had shown only low values.

Black, Campbell and Swicaffer, who are operating a lease on the Wild Bull property adjoining the Wild Bull mine in Wild Horse canyon, have opened up some very rich ore in a crosscut at a depth of 80 ft. The gold occurs in an oxidized gangue, mixed with sulphides.

Scott & Wakefield, lessees on the Snowsall property in Victor canyon, have been crosscutting at a depth of 60 ft. in an ore body said to run not less than \$12 to the ton of milling ore. The ledge has been crosscut 60 ft. and the two faces are still in ore.

The office of the Seven Troughs Mining Co., operating the Seven Troughs mine, is soon to be moved from Provo, Utah, to Vernon, Nev. It is reported that the company will ship no more ore for outside treatment, but will confine its efforts to sinking the shaft to the 1,000 level. The shaft is now down about 650 ft. It is estimated that the 1,000-ft. point will be reached in about three months. A mill of at least 10 stamps is to be erected on the company's estate, near Vernon, and will be ready for operation by the time the shaft is completed. Large bodies of high-grade shipping and milling ore have been blocked out and will be extracted. It is expected that larger and richer ore bodies will be encountered as sinking progresses.

#### Round Mountain.

A remarkable find of leaf gold is reported to have been made at a depth of 185 ft. in the shaft on the Hubbard-Cushing lease on the Black Hawk claim of the Round Mountain Red Top Mining Co. Good pinnings have been obtained since the 170-ft. point. The entire shaft is in ledge matter and the walls have not yet been disclosed. It is the intention to continue sinking for from 50 to 100 ft. farther and to begin crosscutting drifting or stoping, as may be advisable.

The Round Mountain Nugget Mining

Co. has recently acquired a lease on the Round Mountain Extension ground on Stebbins hill. On the lease is an incline shaft down 150 ft., following a 2-ft. ledge, which has been exposed the entire distance. The ledge is of cyaniding grade and arrangements are being made to have a cyaniding plant installed at the new Solid Gold mill, now in process of construction, for the purpose of treating this ore. A gallows frame and power hoist will shortly be installed.

The work of sinking the shaft on the Myrtle D. fraction on the flat just below Stebbins hill is being continued by Anton Cordez and Harry Davis. The shaft is now down 60 ft. and is still in wash. The fraction is owned by Mr. Veice and associates of Marshallton.

Good progress is being made by Contractor C. E. Rice in the construction of the Solid Gold mill. The framework is all up. The corrugated iron for covering has arrived and is being put on. Part of the machinery is expected at the same time, and the erection of the chimney and boiler room can be begun. Three machine drills have arrived and will be put to work in the mine at once. A trestle from the crusher to the dump is being built. A small force of men is at work blocking out ore, which will not be taken from the mine until the mill is ready to treat it. William Madigan is in charge of the property.

#### Rhyolite.

Superintendent Sheridan of the Home-stake mine in the Bullfrog district reports that better than 20 ft. of milling ore shows on the 400 level and more than 4,000 tons has been broken down. The mill is working satisfactorily, and it is believed that a high extraction is being made, although no tests have been made to determine it. A small cleanup of the plates was made recently, but a general cleanup of plates and zinc boxes will not be made for some time, as the cyanide tanks are not yet in proper working condition.

The new shaft on the lease of Captain E. P. Miner, J. P. Burns and Alfred Johnson on the Capricorn property in the South Bullfrog district recently broke into an ore body at a depth of 35 ft. that is very rich in horn silver. A shipment returned about \$200 to the ton, practically all in silver. The ore body will be followed to a depth of 60 ft., when hoisting machinery will be installed if the richness continues.

Plans are being made by the Puritan Co., operating in the Crystal Springs section, to install a 25 hp. hoisting plant about Sept. 1 and to resume sinking. The shaft is now down 100 ft. and will be sunk to the 300 level before any lateral work is done. Work was stopped some time ago on account of the hot weather and the lack of machinery. The owners are now prepared to do extensive development work. E. G. Giles is superintendent.

The July cleanup at the Montgomery-Shoshone is reported as the largest within recent months, consisting of 10 bricks of bullion from the zinc boxes weighing approximately 13,000 ozs. The exact value is not given, but it runs from \$4

to \$4.50 per ounce. Forty tons of concentrates that will return something like \$700 to the ton were shipped. It is said that the ore in the laterals from the 600 level is showing a steady increase in value with development.

#### Atwood.

A strike of a 2-ft. vein of free-milling gold ore averaging \$100 to the ton is reported on the 200 level on the Butler mine. There is a 4-ft. vein running \$82 to the ton in the south drift. There is a 15-hp. gasoline engine on the property. Mr. Butler is now conferring with associates in Los Angeles regarding the advisability of building a mill.

The Gold Crown property, owned by Frank Everett and associates, is equipped with a 15-hp. gasoline and a 25-hp. boiler. A Cameron pump has recently been installed and the mine has been unwatered. At 150 ft. there is an ore shoot for 50 ft. along a drift. There is a large body of ore at 200 ft. and at 250 ft., the lowest point, there is 30 ft. of vein matter. Several carloads of good ore are on the dump and the hauling of ore to the railway station has begun.

On the Griggs-Atwood lease, owned by J. G. Richardson, C. V. Gillingham, J. M. Miller and W. H. Griggs, a shaft is down 100 ft. and stoping is going on on the 60 level. The ore runs about \$50 to the ton, \$40 free milling. The property is equipped with a 15-hp. gasoline engine and hoist and a newly-built 3-stamp mill, which saves practically all of the free-milling values. There is about 25 tons of ore on the dump.

The shaft on the property of the Atwood Mines Co. is down 170 ft., with the bottom in ore, 2 ft. of which runs \$55 to the ton. One thousand feet of underground work has been done. There are a number of new applications for leases.

A depth of 150 ft. has been attained on the Lone Star property, owned by James Dunean and Frank Everett, and 200 ft. of drifting has been done. Some 20 tons of ore is sacked, ready for shipment.

#### MISCELLANEOUS CAMPS.

**Virginia City.**—The parts of the large pump for the Ward shaft at the Comstock are being lowered to the station at the 2,476 level and work will be rushed by the Comstock Pumping Association so that the sinking of the shaft to the 3,100 level may be resumed. The capacity of the pump now being installed is 1,500 gals. per minute against a head of 1,600 ft. A second pump now on hand will be installed at the 3,100 level. It was first intended to place both pumps at the 3,100 level, but owing to the heavy load of water a change of plans was necessary.

**Tecopa.**—After a short shutdown due to the low price of lead, the Tecopa Cons. Co. has resumed operations and nearly 50 miners are at work. In a crosscut on the 800 level a large body of high-grade milling ore has been encountered. The strike is considered of considerable importance. Tests are being made to determine the type of concentrating plant that will best treat the ore. In the meantime development work will be pushed.

**Currite.**—The big sulphur beds at this

place have been sold by Ellsworth Oldi and associates to J. T. Austin, A. E. Lilie and others.

## OREGON.

### Grant's Pass.

On account of being unable to keep the smelter supplied with coke through shortage of teams, the Takilma Co. has been obliged to close down its reduction plant on the Waldo copper mines. The long haul between Grant's Pass and Takilma was over 40 miles of mountain road. The smelter was operated only two months this summer, turning out during this time about 1,500 tons of matte. An electric railway line is now being surveyed from Grant's Pass to Waldo. Contracts for ties have been let, and it seems certain that the district will have railroad connections with the outside world before another season. In the meantime the company is keeping a large number of men employed in the development of the claims.

For reasons known only to the management, the old Braden mine of Gold Hill district has been closed down. It is believed that the troubles are internal, and that they will be adjusted after a few months. The Braden is one of the oldest quartz mines of the district; and has always been a good producer. It is now developed to a depth of 800 ft. One year ago its old mill was torn down and replaced by a larger one. Other improvements were made on the property, and it has been operating for several months on a much larger scale than formerly.

The strike made by Wintering & Osgood on their quartz claim on the Oregon-California line is developing into one of the richest and best of the season for that district. Ore values were estimated to be \$50 or more to the ton. The main ledge lies on a porphyritic and slate contact, and is 150 ft. wide. The pay shoot lies diagonally across the big ledge and has a width of 20 ft. The ledge has been traced on the surface for a distance of three miles. There are six claims in the property, owned by Jim Wintering of California and F. H. Osgood of Seattle, Wash. They were offered \$100,000 for the group by the United States Smelting, Refining & Mining Co., but the offer was refused. It is the intention of the owners to thoroughly develop the property and install a stamp mill.

The rich quartz discovery on Williams creek, near Grant's Pass, made by Harrison brothers in February, and from which over \$30,000 in free gold was taken in less than a month, is being deeply developed with excellent success. The owners have sunk a shaft from which drifts have been run to encounter the main ledge. At a depth of 150 ft. the ore body is strong and wide. The quartz is of good grade and the ledge gives every indication of being permanent. Shipments of the ore are giving good returns. This strike caused a general rush to the district and a great amount of development work has been done during the summer. Several very promising properties have been opened

up and a general revival of the old camp has resulted.

The season which has just closed in the counties of Jackson and Joseph was one of the best the surface miners have enjoyed for many years. While an accurate estimate of the output for the several mines cannot be had, owing to the fact that many operators shipped their gold direct to the mint or refineries of other states, it is believed that the total comes very close to a million. The largest cleanups, as usual, were made by the Sterling of Jacksonville district, Royal group of Galice district, Deep Gravel of Waldo district, Columbia of Gravel Creek district, Howland & Cook of Jump-Off-Joe district, Ruble of Wolf Creek district. The cleanups of these properties ranged from \$10,000 to \$50,000 each.

The hydraulic placer miners are now repairing their sluices and overhauling the properties preparatory to another season's business. A number of the larger properties are placing additional equipment and increasing their capacity for work. Several new properties are also being developed and equipped. The placer miners gave more time and attention this season than usual to the saving of platinum.

## SOUTH DAKOTA.

### Deadwood.

A mill for the treatment of the large ore bodies on the property on Castle creek, near Rapid City, is now assured through the organization of the Crown Mining Co. by Messrs. Schrader and Lewis of Rapid City. The new company is capitalized at \$500,000. Half of this amount will be practically available at once for the erection of the mill. The Crown ground has been considerably developed in the past and will require little more work to put it in producing shape. The ground is situated seven miles southwest of Rochford in a productive district and includes 130 acres. The development of the ore shows a ledge extending 4,500 ft. across the property. This ledge has been well opened up by a series of prospect shafts from 15 to 25 ft. deep. Where the creek breaks through the formation it exposes the ledge, showing a width of 60 ft. and a height of 120 ft., making the mining of the ore much of a quarry proposition and decidedly economical. This portion of the ledge has been thoroughly sampled and assays from \$3 to \$100 to the ton in gold, averaging \$6 to the ton. Much of the value is in free gold, while the remainder can be easily concentrated. It is proposed to have the mill of large capacity and to be treating ore within another year.

If present plans carry, the Pennsylvania Mining Co. will soon resume operations. The principal business before the coming annual meeting to be held at Williamsport, Pa., Sept. 5 is to authorize the directors to borrow a sufficient sum of money to commence operations again on the property in Deadwood gulch, near Lead. This ground is one of the best in that section. It lies directly in the phonolite belt and parallels the Home-

stake workings on the west. It is owned and controlled entirely by Pennsylvania people, and some years ago was operated by the company with considerable success. The last shipment to the Rapid City smelter returned \$13.50 per ton in gold. The company owns a hoist and complete hoisting machinery, but no treatment plant. It is a close corporation.

The Golden Placer Co., whose annual meeting will be held here on Sept. 3 is planning to raise \$30,000 to continue the operation already commenced. The company has the only mill in the Black Hills treating the placer deposit. The mill was but recently started on the ore from the Kicking Horse property up Blacktail gulch and is making a good run so far. If the new money is raised it will be used in the further development of the property and for additional equipment of the treatment plant.

## UTAH.

### Salt Lake.

Information has been received that the Sioux Cons. forces have broken into the high-grade ores in a drift from the 400 level. For several days they have been on the outcropping from the main ledge, and nothing but a second-grade ore was in evidence. By drifting from the lower workings in the property the management demonstrated the continuation of the high-grade ore zone, and as it is some distance from the end lines of the Colorado, it is natural that the engineers should conclude that the rich deposits are continued for the full distance across these two properties. As the Sioux management has determined the continuation of the ore zone from 300 to 400 ft. in depth, it seems probable that this mine will be able to prove the ore channel for a greater depth.

The main tunnel of the Verona mine at Bingham is now in over 300 ft. The face of the channel is heavily mineralized and for a distance of more than 14 ft. the tunnel has been going through the foot wall. At this point in the development work everything indicates that in 30 or 35 ft. the tunnel will have a full face of ore of a shipping grade. A contract has been let for 100 ft. additional of tunnel.

The regular monthly dividend of three cents a share, amounting to \$3,000, was posted by the directors of the Utah mine during the week. The management has been instructed to close the deal for the Last Chance claim, which adjoins the Utah properties in the Fish Springs section.

The control of the old Emma mine at Alta, which during the early seventies produced over \$1,000,000 worth of silver-lead ores, has passed into the hands of Jesse Knight and his associates. The mine has been practically closed down for a number of years, but it is said that a large force of men will be put to work at once cleaning it out and doing development work.

General Manager Hanchett of the Newhouse staff, who has returned from an inspection trip to the Cactus mine in Beaver county, states that Superintendent Drummond has been unable to determine

the extent of the find on the 900 level up to the present time, but that the men are now in ore that averaged 4% copper and runs high in iron. The property has now been proved to carry a fine grade of copper from the surface to a depth of 900 ft. and as the latest work indicates the ore zone to be still strong it would seem that there is no question but that the ore will be found continuously for considerably greater depth and will insure a regular production for many years to come.

Tony Jacobson, manager of the Columbus Cons. properties at Alta, states that the miners are in the drift about 1,400 ft. from the main working shaft. They have been in ore for more than 200 ft., and while a great deal of it is of the milling variety, they have mined some high-grade deposits, and in stopping they may find a great deal of first-class ore. The management does not intend to stop for stopping at this time, but will continue the drift for another 300 ft., when the men will be under the proper shaft where the high-grade product was encountered. It will take another month to complete this work and then regular shipments will be made. In the meantime a good tonnage of second-class product is being gotten out, which is being treated at the mill with three shifts. Some shipments of concentrates are being made, and from this the company is getting sufficient revenue to pay operating expenses and to leave a comfortable surplus.

Four feet of ore averaging over \$250 to the ton has been opened up in the lease operated by Duncan Frew and others on the Webster property at Marysville. The Webster is owned by the Ivanhoe Mines Co., which comprises the majority of the properties under the ownership of the Hearst estate and John B. A. Higgin of New York and Chicago.

## WASHINGTON.

### Republic.

The Greenoughs, owning the Snowstorm mine and other Coeur d'Alene properties, have bought a controlling interest in the Laurier mine, a copper and silver property at Laurier, near the international boundary line. The mine is but nine miles from the Granby smelter, and only a short distance from a spur of the Great Northern railroad, which will make shipments convenient and cheap. The property will be at once developed by a crosscut, tapping the ore at a depth of 225 ft.

The Advance Mining Co. at Covada has struck galena in a tunnel on the 300 level, which is reported to be increasing in value as the work progresses. The pay streak is about 16 in. wide.

A crew is at work on the Silver Leaf property and the showing is said to be good.

Steps are being taken to reopen the Bonanza mine of the Deer Trail Mining Co., which last year shipped about 350 tons of ore, but was closed down by low prices. The property is in the Republic district. A large amount of money has been spent on development and it is thought by the management that owing to the advancing price of lead a small

amount of capital would put it again on a shipping basis.

Work has been resumed at the Copper King. The winze started over a year ago, when the mine was forced to close on account of the weakness in copper, will be continued over 200 ft. A cross-cut tunnel will then be run to tap the ore at 550 ft. and an upraise run to meet the winze. Favorable consideration has been given to the building of a spur five miles long by the Great Northern railroad. This would make profitable operation of the mine certain and would also greatly aid the United Copper property. Shipments will begin this fall or winter in any case.

The United Copper Co. is now operating four large drills, which have taken the place of lighter equipment. The boiler recently installed to increase the power is now in use and work is progressing favorably.

The Northport smelter is operating steadily, one furnace only being in use. The smelter will receive the ore of the Copper King when that property begins shipping.

The Eagle Co. is now working a small crew with good results.

Development on the Butcher Boy has also been commenced.

A strike was recently made on the Last Chance and Key properties, adjoining the Comstock in the Newport district, of a ledge of rich silver-bearing lead carbonates  $\frac{3}{4}$  ft. wide. Work has been temporarily suspended pending a reorganization and consolidation of the Last Chance, Key and Comstock claims. The strike was made at the bottom of an 83-ft. shaft. The property is owned by J. M. Cullerson, H. McCullough and E. Alger of Northport.

A body of lead ore said to assay up to 35% lead has been exposed in a tunnel on the property of the Silver Lead Co. in the Metairie district. The body is a chimney formation that increases in richness with depth. The ore is thought to be desirable as a flux and arrangements are being made to contract it out the ground to the Sandpoint smelter. I. L. Long is manager.

### Orient.

Active operations have been suspended for a short time at the Railroad group of the Summit Mining Co. at Orient, pending the installation of an air compressor. The property is said to have excellent showings. N. F. Johnson of Spokane is manager of the company.

Considerable activity is being shown at the Beecher mine. The mining force has been increased and gold ore is being taken out and sorted for shipment and will be hauled to the railroad station as soon as sacks arrive. Some good strikes of free-gold ore are being made on the property. Jack Gilpin is superintendent.

## WISCONSIN.

### Benton.

Shipments from the Benton camp for the previous week included eight cars of zinc and two of lead concentrates, the Etina Hill and the Frontier shipping four cars of zinc ore each. The Pittsburg-

Benton shipped one car of lead and a mixed car was sent out. Lead ore reached a point around \$92 for 80% concentrates.

The Frontier continues its weekly production of three cars of high-grade zinc concentrates assaying 50% zinc, one car of lower grade ore assaying 32%, and about five tons of lead ore. The entire surface equipment has been in operation steadily since its completion early last January. Investigation of cost sheets show a nominal cost per ton of less than \$8 for all grades of ore. The property is located on the immediate right-of-way of the Northwestern railway and sidings accommodate the easy shipment of ores from the mill, from which it is loaded direct into cars through runways leading from the bins.

One of the largest single sales of zinc ore was made last week by the Corr Mining Co. to Del U't, local buyer for the Platteville electrical separating works, and before shipments will have been completed will aggregate over 700 tons of zinc concentrates. It is said this ore will be shipped direct to the smelter at Caney, Kas. The Corr during the greater part of 1907 was exclusively a lead producer.

The Pittsburgh-Benton has a fine showing in both lead and zinc ores, one car going last week. Zinc shipments for 1907 amounted to 3,250,000 lbs. of zinc ore and 250,000 lbs. of lead ore, the first shipments going March 1. The mine was closed down Oct. 1 with three cars of concentrates in bin.

The Fox Lead and Zinc Co. is making a record breaking run, the daily output being sufficient to defray a considerable part of operating expense. Shipments of zinc concentrates are being made weekly to the calciner equipment of the Enterprise Mining Co. at Platteville. Z. Bennett & Bros. were awarded the contract for 100 ft. of drifting at \$3.50 per foot. Another contract was let to Noble & Lyght for sinking No. 3 shaft 30 ft. deeper. The company is in good shape again financially.

Another pump has been installed at the Winskill and the property has been watered.

Grani mill No. 2, recently destroyed by fire, will be rebuilt.

A combination has been made with the Monarch, Empress, Amalgamated and two Jug Handles, usually known as the Keel and Anderson string of zinc mines, to hack up a new spelter concern, whose bonds are being floated in France. The original location was to have been on the site of the Wenona spelter works, at Wenona, Ill., but officials of the new project are favorable to a new site near the coal mine region adjacent to Springfield, Ill.

#### Cuba City.

The shaft on the Lucky Twelve, operating on the Murphy farm, south of Cuba City, has been completed 125 ft. deep to the bottom of the stimp and drifting ahead is being done on the ore deposit, which shows a net recovery of ore in the rock better than 15%. The ore deposit will be blocked out for a distance of several hundred feet before any

attempt will be made to increase the surface equipment.

Eight cars of lead ore have been shipped from the Henrietta since May 1. The ore run has been blocked out for several hundred feet, but no attempt will be made to work the zinc ore shoots until better market conditions prevail. Provision has been made in mill building to install another 8-cell jig when necessary.

#### Platteville.

Old shareholders of the Weigle are subscribing to stock in a new organization which will take over the assets of the company and liquidate all outstanding accounts. The Weigle is one of the big strikes made in this camp. Shipments were frequent, but the low price of ore precluded the possibility of profits and the company could not clear itself from debt.

The management of the Cruson has decided to equip with concentrator and plans and specifications have been called for under a short-term contract. Shipments of hand-cleaned ore made from this mine recently assayed better than 50% zinc. The ore face is 7 ft. in the clear.

The Simset mine at Rewey is offered for sale at public auction by W. E. Lewis, trustee. The property consists of 120 acres of mining lands in the heart of the famous Mifflin range, well equipped with power, pumping and milling machinery and all necessary mining appliances. Two deep shafts connected offer easy inducement to continue the work of mining the ore, which is well developed.

#### Highland.

It is probable that the zinc trust will buy up all the mining lands in this district, the only camp in this mining field capable of producing two to three cars of dry-bone concentrates daily. The Mineral Point & Northern railway was built by the New Jersey company three years ago and this camp and Linden must make up the business for this line. Extensive mining operations are therefore necessary at both points. Linden is destined to develop into a great zinc blende mining camp. This camp is better known for its turnout of carbonate ore. Five cars of this grade of ore are being marketed weekly.

## CANADA.

### ONTARIO.

#### Cobalt.

The Cobalt Central Mines Co. has begun diamond drilling in the Big Pete mine to prove up the many veins which have been discovered on Diabase mountain and ascertain the best method of opening them up for production. The new vein recently encountered in the third level is about 4 ft. in width and gives assay values running 60 or more ozs. to the ton. Crosscutting has also begun from the bottom of the shaft on Lot 80, now down 117 ft. It is expected that an extension of the Crown Reserve vein will be encountered at this level. These crosscuts will also open up other good veins that have been exposed on the sur-

face, one of which shows surface mineralization for a width of 20 ft. that will run \$20 to the ton. Experience in the Kerr Lake district has proven that the richest values in the Diabase formation are found at a depth of over 100 ft., and it is expected that the work now in progress on Lot 38 will practically double the tonnage of ore available for treatment in the concentrator, the tonnage of ore available for treatment in the concentrator, the capacity of which has recently been raised to 100 tons a day to take care of the rapid increase in the Big Pete ore production.

## BRITISH COLUMBIA.

### Rosland.

W. Y. Williams, consulting engineer for the Granby Co., was in town during the week inspecting the extensive development work being done on the Giant-California group. Only sample shipments of ore have been made to the smelters. The work is now nearing a point where extensive ore bodies are thought to exist and in a short time this zone will be thoroughly explored with diamond drill.

The Hattie Brown mine in the South Belt has been leased by two local miners and a good looking body of ore has been uncovered. A carload shipment will be made as soon as possible for test purposes.

The shaft on the Golden Rule has been sunk to a depth of 30 ft.

The shipments of ore from Rosland for the week ending August 15 and for the year up to and including that date were:

Mine.	Week	Year
Centre Star	3,990	110,781
Le Roi	1,950	51,169
Le Roi 2, Ltd.	190	16,014
Evening Star	...	613
Honesty	...	25
Curlow	...	39
Mayflower	...	35
Blue Bird	...	145
Red Eagle	...	29
Sunset	...	25
Giant-California	...	35

The receipts of lead ore at the Cons. Co.'s smelter at Trail for the month of July, as furnished by the supervisor of the lead bounty, are as follows:

	Net Weight	Lead Contents
	Lbs.	Lbs.
Arlington	228,204	18,975
Alpha	39,939	15,629
Blue Bird	29,196	9,862
Blue Bell	809,294	493,722
Curlow	13,479	586
Empress	2,138	11
Fergus	170,015	47,260
Giant (Golden)	35,564	24,113
Keystone	16,283	291
Louis Robert	1,000	87
No. 1	27,532	82
Reco	81,162	23,982
North Star	1,408,949	296,298
Ruth	152,674	50,948
Sally	38,252	2,148
Slocan	46,586	17,796
Rambler-Carlton	122,396	252,890
Richmond-Bureka	241,425	70,179
Sunset	163,077	119,574
Silver Glance	9,648	86
St. Eugene	4,622,696	2,637,815
Silver Star	87,269	241,290
Whitewater	571,963	268,685
Whitewater Deep	88,567	40,495
Westmont	86,758	6,779
Total	5,480,798	4,922,772

In addition to the second column, showing the proportion of lead carried in the

ores of the mines named, the first column will give a good idea of what many of the mines in the Slocan and East Kootenay districts are doing in the way of shipments to the smelter at Trail.

Shipments from this district for the week ending August 15 were somewhat under the average that has been maintained for some months past, partly owing to the feeling of uncertainty as to the coke supply for the immediate future. It is understood, however, that there is no cause for anxiety in this direction, and that there is not likely to be a shortage. Coke shipments will be resumed from the Fernie mines in a week or 10 days.

The ore shipments for the above week and for the year to Aug. 15 were:

	Week	Year
	Tons.	Tons.
Granby Mines .....	16,039	654,605
Mother Lode .....	10,191	38,365
Oro Leonoro .....	3,450	22,784
Brooklyn-Stemwinder .....	6,400	8,679
Rawhide .....	1,220	10,620
Sunsel .....	262	3,802
Mountain Rose .....	140	525
Altheim .....	140	120
Snowshoe .....	140	267
Sally .....	99	99
Crescent .....	99	60

On Wednesday of the week reviewed the Dominion Copper Co. ceased operations at both its mines and smelter. This was owing to the fact that this company did not have as large a reserve of coke on hand as did the Granby and British Columbia Copper Co. The Dominion Co. has arranged for a supply of coke from the Pacific coast coal mines and will resume work again. This company sustained a heavy loss on Thursday, when the machine shop at Boundary Falls, equipped with up-to-date machinery, was destroyed by fire. Owing to the closing down in the middle of the week, the Dominion Copper ore shipments and smelter treatment were light.

At the British Columbia Copper Co.'s **Mother Lode** mine, near Greenwood, a new strike of high-grade chalcopryite ore was encountered after breaking through the hanging wall of the main low-grade body on the 400 level. The company is crosscutting the face of the new body, and so far are in on it 36 ft. This is the most important strike ever made in the district, as the ore runs from \$20 to \$40 in copper and gold to the ton, and in consequence mining men are again visiting the camp and trying to make arrangements for options on ground in the neighborhood of the Mother Lode mine with the intention of thoroughly prospecting same.

#### Vancouver.

An ore body, said to be permanent, was recently struck at a point in a crosscut on the Golden Eagle mine 160 ft. below the surface that averages 4 ft. between walls and crosses two other bodies that have been opened by shafts and from which some 250 tons of good gold ore has been shipped to the smelter. The mine is located on the north fork of Kettle river, 12 miles from Grand Forks, and is bonded to a syndicate of Vancouver people.

## MEXICO.

### Mexico City.

The Compania Minera Las Dos Estrellas, which, about two years ago, changed the motive power at its mines from steam to electricity, has seen fit to electrify its steam railway between its property and El Oro, thereby increasing the equipment to 10 locomotives. Westinghouse electrical equipment will be used.

### Cananea.

One of the largest mining deals that has been consummated in Northern Sonora for some time was perfected last week in the organization of the Kansas-Cananea Copper Co. The deal involves the merger of the Mexican holdings of the Silver Mining Co., the Cons. Gold & Copper Co. and the Miller Mining Co. and is capitalized at \$10,000,000. The properties are contiguous and cover a total of 1,850 acres. The Greene-Cananea entirely surrounds them. Capital for the new company has been subscribed by New York, Chicago and St. Louis men, and is sufficient to carry on all the work that has been laid out. The merits of the property have been thoroughly examined into. David Miller is president of the new company. All liabilities and assets of the old Ortego Mining Co. will be assumed and A. B. Wadleigh, formerly in charge of that company, will be the general manager of the new concern.

A. J. King has just returned from the east, where he has been for several weeks past in the interest of the Rosales mine. He succeeded in raising sufficient funds to tide over a temporary embarrassment and has enough subscribed to carry on work at the mine for an indefinite period.

B. J. Neff left Douglas, Ariz., last week to take charge of the construction work of the Lluvia de Oro Mining Co. A new mill is being erected and considerable other work of a new and important nature is being carried on.

At a recent meeting of the directors of the Buena Fortuna Gold Mining Co. in the Magdalena district it was decided to purchase and install several thousand dollars worth of machinery. M. J. Purcell, general manager, has already gone east to select the items needed.

T. J. Whalen has taken some samples from a recent denouncement in the Montezuma district which ran very high in gold and silver. His claims lie directly south of the El Tigre mine and embrace about 40 pertenencias.

A meeting of stockholders of the Esparita-Santa Gold Co. has been called to be held in Bisbee, Ariz., Sept. 1. New officers will be elected and an effort will be made to have the work at the mine pushed more vigorously than heretofore.

The Fortuna Mining Co. of Douglas, Ariz., owns 425 acres of ground in the Montezuma district, comprising seven distinct properties. Three of these cover the Tigre veins, the one on the south called the Fortuna overlying the largest vein worked by the El Tigre Co. Two levels of the El Tigre are being driven on this vein toward the Fortuna holdings. This company has been organized but a

short time. It is claimed that all the surplus stock has been taken up in Douglas and El Paso, Tex., and that steps will be taken to open up work at once.

### Chihuahua.

The Pinos Altos Mining Co. is said to be planning on the early erection of a large concentrating plant in the Ocampo district. The machinery for this plant was ordered last fall, but for one reason and another its installation was deferred. A number of leases have been taken on this company's properties and the leasers are said to be meeting with success.

A recent shipment of approximately 30 tons of concentrates and crude ore from the Margarita mine of the Rio de Plata Mining Co. in the Guazapares section gave the following returns: Concentrates, 1,236 ozs. silver and crude ore, 2,500 ozs. The lately discovered ore body has widened in one tunnel to 6 ft. of 212-oz. silver ore. Good progress is being made in the erection of the 100-ton cyanide plant, which will be in readiness about the first of the year, by which time there will have accumulated several hundred thousand dollars' worth of high-grade tailings. D. W. Shanks, the company's general manager, accompanied by M. R. Lamb, cyanide engineer of Mexico City, was lately at the property superintending the installation of the Moore filter presses and other cyanide machinery. A telephone line has recently been completed to the mine and a number of surface improvements added. This property is developing into one of the most important and profitable in the state.

Increased ore shipments are reported at both the Chihuahua and El Paso plants of the American Smelting & Refining Co., the Mexican tonnage going to the latter plant through the Chihuahua sampling agency being about 3,000 tons per month at present. The Chihuahua plant, with two furnaces in blast, is treating about 300 tons daily, and is receiving a sufficient amount of ore to warrant the belief that a third furnace may be shortly put into commission.

The production of the Parral camp for the week ending Aug. 8 was over 8,500 tons, as compared with 7,550 tons for the week previous. It is likely that several new shippers will be added to the list, and that the output will materially increase during the next few weeks.

There is now a persistent rumor that a new company will shortly resume operations at the Greene Gold-Silver properties in the Ocampo district. It is intimated that the new concern is one controlled and backed by the Cole-Ryan people, in which event more systematic and successful operations are anticipated. In the meantime the entire region of which Madera is the distributing center is swarming with idle men who have been unable to secure sufficient funds on back wages to enable them to go elsewhere. For many of the laborers the situation was, and is, rather critical owing to the scarcity of foodstuffs.

The Palmilla mine, adjoining the La Luz and Refugio properties in the Parral, is now being extensively worked by

W. W. Robinson of Kansas City. A deep shaft is in progress, machinery being installed and commodious houses erected.

The Watterson concentrating plant at Urrachic has been in commission for several weeks, and it is given out that the reverberatory smelting plant is to be started up shortly, in the event of which an impetus will be given to operations in the district.

The Earl Syndicate, Ltd., is prosecuting very encouraging development work at the Dios de Guine mines in the Sierra Madre section. Alex. Bonthron is in charge.

The San Enrique properties, near Itaca and in proximity to the famous Cigarero mine, are being operated by the Almolero Mining Co., of which N. O. Bagge is general manager and V. C. Joslyn superintendent. A 1,500-ft. 3-compartment shaft is in progress.

#### Oaxaca.

The great bonanza recently found in the Narivindine mine in this state is holding out beyond expectation. Already the ore shoot has gone far beyond the record of production from a single body of high-grade ore. No. 1 ore is being sorted to 19,000 pesos to the ton and is the only class being shipped. The average for the past six weeks has been two tons per week of this class of ore, sold in Oaxaca. There is a large quantity of the same class awaiting transportation, as the mine is two days' ride into the mountains and the rains at this time of year make transportation difficult, but with opening of the dry season the quantity of shipping ore will be increased. All ore under 10,000 pesos is being stored. Some will be shipped after the rains stop but the greater part of the low-grade ore will be treated at the company's plant. At the present time there are 570 cubic meters of high-grade ore blocked out.

A body of high-grade ore was recently cut into on the 212 level of the San Jose mine in Taviche. The extent of the ore body has not as yet been ascertained.

The sinking of the shaft on the Maravilla property is continuing rapidly. The shaft is being sunk on one of the veins of the property and drifting will be begun on the 100 level and a crosscut started to cut a parallel vein.

Prospecting is being continued on the Andes Bullion property and it is expected that active development work will be begun in the near future.

A trial run will be made at the plant of the Zimitlan Mining & Milling Co. some time this month. The blocking out of the ore in the mine is continuing.

The August payment on the Zavaleta mine was made on the staff it fell due.

The explorations of the Oaxaca Coal & Iron Co., which is extensively prospecting the coal and iron deposits in the vicinity of Tlaxiaco, have developed the fact that there are seven extensive coal beds in that region, varying from 2 to 10 ft. in thickness. The coal is of excellent quality. Heretofore it has been the general idea that the coal in this section would be difficult to handle commercially, as it was supposed to contain a large percentage of slate and bone. The

prospecting done by the Oaxaca Coal & Iron Co. was done lower down than any previously done and the coal has been found to be of excellent quality. Thirty American engineers are engaged in the work.

The Triunfo and Electra prospects in the Epulita district have been sold by George Clarke to Adolfo Fuos for 3,000 pesos.

Two strikes were made last week in the Totolapain district on the San Ignacio and the Tepehuape properties. The former belongs to Rickards Bros. and the latter to J. T. Hall. The amount of high-grade ore in neither case has been definitely ascertained. The pay streak in the San Ignacio is 45 centimeters wide and the sample sent to this city assayed 15 kilos silver, with 32 grams gold.

The Salome and Victoria property in the Tlacolula district, formerly belonging to George McGillevray have been sold to M. L. Germain for 2,000 pesos.

Sinking on the El Placer is now being carried on in the main shaft on the property. The present depth of this shaft is 130 ft. and will be sunk 200 ft. deeper. The shaft is in ore and extraction is continuing with the sinking.

A transfer of the Protectora y Anexas was made last week to the Georgia-Mexico Mining Co. The property was owned by A. P. Ennis and adjoined the Socorro property of the above company.

Arturo Buttner, manager of the Santa Catarina Mining & Milling Co., has returned from the United States and states that his company has increased its capitalization \$35,000. In addition, it was decided to install five additional stamps in the mill.

The machinery for the San Pablo mine near Tejonmuleo was started to the mine last week.

The new steam plant on the Duende mine in Taviche has been started. The gallow's frame was completed last week and the machinery started at once. Sinking in the incline will be begun at once and lateral development continued.

The Rio Seco Mining Co., operating near Parlan, made a sample mill run last week, 1 1/4 oz. of gold being obtained from a run of two tons.

The Southern Star Mining Co., recently formed in Kansas City, has purchased a plant of machinery and will begin work on its property immediately on its arrival.

The sinking of the Rosario shaft to the 800 level is progressing nicely, and despite the large amount of water being encountered the work is not being delayed. Lateral development is continuing in six faces.

The Georgia-Mexico Mining Co. has completed arrangements for the building of a mill on the Socorro property in the Nochistlan district. The plans for the mill will not be made public until after the contract is let, which will probably be this week.

Geo. W. Beard has been appointed local representative of the Pittsburg-Oaxaca Mining Co., taking the place of W. H. Baird, who died recently. The company is operating the Zavaleta mine.

Work has been opened on the Stand-

ard property in the San Jose district and a tunnel has been started on the vein.

#### Guadalajara.

R. L. Mayfield of Shreveport, La., one of the men principally interested in the Aztec Queen Mining Co., owning the Huicicila mines in the territory of Tepic, has purchased the Palo Quemado, Ampliación del Palo Quemado and Productora mines in the Hostotipaquillo district of this state from Etzatlan people. The price was \$40,000. The deal was closed here by W. E. Clark, manager of the Huicicila mines, who represented Mr. Mayfield. The three mines purchased are adjacent to the famous Mololito mine, now owned by Canadian interests, and the big El Favor mine of the El Favor Mining Co. The Palo Quemado is the only antigua of the group, and, according to records in Hostotipaquillo, it has produced ore running 6,000 grams silver to the ton. Mr. Clark will at once make arrangements for new development work and will let contracts for the sinking of three deep shafts. The surface holdings amount to 54 pertenencias.

The Aztec Queen Mining Co. has taken under option a water-concession on the Compostela or Miravalles river in Tepic. It is estimated that 4,000 hp. can be developed under the concession and the company plans to later install a hydro-electric plant and generate current for mining and milling purposes and the operation of an electric line from the mines to the Pacific port of Platanitos, a distance of 10 miles. The Aztec Queen Co. has a capital of \$3,000,000. The principal stockholders are Thomas Stables of Stables, La. W. B. McCormick and R. L. Mayfield of Shreveport, La. General Manager W. E. Clark, who is now in Guadalajara, states that the company will erect a concentrating plant and smelter at the mines within the next year. The initial capacity of the smelter will be at least 50 tons daily. Development in the San Francisco and Trinidad mines of the Huicicila group is expected to place in sight fully 200,000 tons of ore. The principal mines of the group are antiguas with records of heavy production.

A report just issued of the stockholders of the Carrizo Copper Co., owning a custom smelter at Ayutla, state that work began on the smelter on Oct. 7, 1907, and it was blown in June 11, 1908, without a hitch, it running smoothly from the start. The smelter has always been calculated and represented as capable of smelting 50 tons per day with a cold blast or 80 tons per day with a hot blast. It actually ran at the rate of 88 1/2 tons per day with a low pressure on cold blast, and Manager A. L. Waters states that it will average, under all conditions, 75 tons per day on cold blast, or easily 100 tons per day on hot blast.

C. D. O'Brien, Jr., general manager of the Mascota Copper Co. of St. Paul, Minn., states that the recently-installed drill plant is now in operation at the company's mines in the Guachinango district of this state. The drills are being used in driving a 2,000-ft. tunnel into the Independence property. The company contemplates resuming concentrating operations within a few weeks.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to The Mining World who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

At the annual meeting today of the Wolverine Mining Co. the present board of directors was re-elected. At a subsequent meeting the old officers were re-elected.

Of the total of 150,000 shares of stock of the Bingham Cons. Mining & Smelting Co., 93,454 shares have been deposited with the Federal Trust Co. of Boston for new shares in the Bingham Mines Co.

The annual meeting of the American Smelting & Refining Co. will be held Sept. 2. After its adjournment the newly elected board of directors is scheduled to meet for reorganization and action on dividend matters.

The Boston Stock Exchange has placed on the unlisted sheet 300,200 shares of the Miami Copper Co. There are 99,800 treasury shares which are reserved for acquiring additional property and enlarging plant. The total authorized capital is 600,000 shares.

The Calumet & Hecla Mining Co. stockholders at their annual meeting at Boston re-elected the retiring directors. Following the Calumet & Hecla meeting, the annual meeting of the La Salle Copper Co. and the Manitowish Mining Co. were held, and in each instance the old directors were re-elected.

The Boston Stock Exchange has admitted to quotation in the unlisted department 80,000 shares of the Lake Copper Co., incorporated under the general laws of Michigan, with a capitalization of 100,000 shares, par \$25, and with \$3 paid in. The remaining 20,000 shares will be retained in the treasury for future development work.

The Cariboo Gold Mining Co. of British Columbia has secured an injunction against J. B. Hobson, restraining him from working mining properties. Some months ago the Guggenheims withdrew from active operations on these properties and it was rumored that they had thrown up their bond. They now allege that Mr. Hobson is no longer in their service and has no authority to continue work, and they ask that he be restrained from disposing of a large cleanup he has made.

The stockholders of the Davis-Daly Estates Copper Co. have received notice of a special meeting to be held in Portland, Me., Sept. 5, to act on a plan to keep the property intact for the stockholders, and provide the working capital necessary to make the property into a dividend payer. The plan calls for the formation of a new company having the same number of shares as the present one. This company agrees to pay \$300,000 cash for all the property, both real and personal, of the present company, and further agrees to pay off its floating indebtedness and make the remaining payments due on some of its property. The new company will own, in addition to

what the present company has, several more properties which adjoin the property now owned and are necessary to the enterprise. All stockholders of the present company have the right to subscribe pro rata to the new shares at the rate of \$2 a share, divided into four installments of 50 cents each, payable Oct. 15, Dec. 15, Feb. 15, and April 15.

The Central Iron & Coal Co., the entire capital of which is owned by the Central Foundry Co., has disposed of \$1,000,000 first mortgage 30-year 5% bonds out of a total authorized issue of \$2,000,000. Of the new bonds \$500,000 were issued to take up an equal amount of 6% notes of the Central Iron & Coal Co., which matured Aug. 1 last, and the proceeds of the other \$500,000 go to the treasury of the company to reimburse it for expenditures heretofore made on the property for extensions and improvements. The bonds are redeemable at 105 and interest on 90 days' notice. The company's property and plants are located in the Birmingham district, Alabama.

### Official Report.

#### INTERNATIONAL NICKEL CO.

For the last fiscal year, ended March 31, net profits amounted to \$1,324,742. Expenditure upon construction and equipment, \$1,548,181; for depreciation of plant, \$215,975; for exhaustion of minerals, \$43,351, and \$168,250 for bond sinking fund. After payment of bond interest and a 6% dividend on preferred stock, the sum of \$700,000 was added to surplus, and \$300,000 added to the property depreciation allowance.

#### WEST END CONS. MINING CO., NEV.

The annual report of the company for the year ended May 27 which has just been issued shows earnings of \$40,672 for the year. This statement includes \$12,821 received for ore shipments and \$27,131 obtained by the sale of 84,554 shares of McNamara Co. stock. The total disbursements foot up \$75,068, the company being obliged to borrow \$12,395 during the year to make up this deficit. The total indebtedness of the company now stands at \$2,080. The company still retains 701,428 shares of its stock in the treasury in addition to 183,091 shares of McNamara Co. stock.

#### BROKEN HILL MINES, N. S. W.

The quarterly returns for the term ended June 30 show a further decrease in value of the products, not only as compared with the corresponding quarter of last year, but also as compared with the March quarter of the present year. From April to June the value of the output was £196,200, which compares very unfavorably with that for the same quarter in 1907, which amounted to £268,335, the

yield for the first three months of this year being £528,794. The details of the last quarter's production compared with the March quarter (given in parentheses) were as follows: Lead, in ore, 33,410 tons, £262,335 (39,216 tons, £281,425); silver, in ore, 1,522,353 oz. £90,092 (1,396,256 oz., £86,918); zinc concentrates, 58,554 tons, £112,637 (117,889 tons, £89,642); silver-lead, crude, 9,799 tons, £22,187 (£7,700 tons, £27,061); copper ore, 58 tons 12 cwt., £277 (15 tons 5 cwt., £38); gold, in ore, 678 oz., £2,712 oz. (£750 oz., £3,080). The quantity of zinc concentrates was 6,500 tons greater than at the same part of last year, and the value nearly £6,000 better.

#### WOLVERINE PORTLAND CEMENT CO.

The annual report of the company for the fiscal year ended February 29 shows a net profit of \$209,084, against \$332,404 in the previous 12 months, and a balance after dividends of \$214,984 against \$497,404. Following are the figures, with comparisons:

	1908.	1907.
Gross earnings	\$755,292	\$587,014
Equip., repairs and taxes	436,729	555,567
Net	\$298,563	\$231,447
Rent and other income	1,421	957
Net profit for year	\$299,984	\$232,404
Previous surplus	200,000	165,000
Total	\$499,984	\$497,404
Dividends	195,000	200,000
Balance	\$214,984	\$232,404
Charged off and depreciation	14,984	37,404
Surplus	\$200,000	\$200,000

\*Equal to 20.91% earned on the \$1,000,000 capital stock.

#### WOLVERINE MINING CO.

The operations of the company for the year ending June 30 is as follows: There was produced from the mine 12,117,000 lbs. of mineral, which yielded 77.21%, against 74.84 last year, or 9,356,123 lbs. of refined copper, against 9,372,982 last year. The following is a summary of the year's business: Receipts, 9,356,123 lbs. copper at 13.16 cents, \$1,231,223; interest, \$13,221; total receipts, \$1,244,443. Expenditures, \$685,042; profit, \$559,402; surplus June 30, 1907, \$1,002,227; total, \$1,561,629; dividends, \$750,000; surplus June 30, 1908, \$811,629. The operations of the mine have been satisfactory and the company has secured a normal production. No additions have been made to the mine or mill plant during the year. President Joseph E. Gat in his report says: "It has been decided to compound the cylinders on our stamp heads, which will insure higher efficiency, also to install electric pumps to handle the mine water, and these improvements, together with a belt conveyor system to facilitate the discharge of our waste material at the mill, will constitute practically all the construction expenditure for the coming year. The general balance sheet as of June 30, 1906, shows: Assets—Cash in bank, \$12,032; deposit in trust company, \$148,090; copper bills and copper on hand, \$345,000; cash and supplies at mine, \$119,907; stock in Michigan Smelting Co., \$80,000; total, \$887,701. Liabilities—Indebtedness at mine, \$57,429; accounts payable, \$18,613; total, \$76,042; balance of assets, \$811,629.





## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. l. f. New York, unless stated otherwise.

( See also Market Reports )

[illegible]

## Latest Quotations on American and Foreign Mining Stocks.

Copper, Gold, Silver, Lead, Zinc, Oulcksilver

(\*) Dividend Payers. (†) Levy Assessments

[illegible]

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**Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies.**

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\* Illustrated.

## Metal Mining Profits.

Dividends are multiplying at a rate which suggests that the metal mines are gradually returning to their normal profit earning status as a result of the higher prices and improved demand for their various products. A careful compilation by The Mining World shows that during the eight months ending with August dividends amounting to the enormous total of \$27,371,754 have been paid by 62 mines and metallurgical works in the United States. Since their incorporation, these 62 properties have yielded the handsome sum of \$188,410,553 in dividends on an issued capitalization of \$404,906,915.

Large as this amount is it does not include the dividends declared by securities holding corporations, metal selling companies and other organizations that derive great pecuniary benefit from the mining and metallurgical industry.

For the past eight months dividends aggregating \$5,530,980 have been paid by six securities holding corporations, making a total of \$75,688,628 since their formation, an excellent showing on their issued capitalization of \$241,926,000. Foremost in this group stands the Amalgamated Copper Co., which controls the famous Anaconda, Boston & Montana and other mines in Montana, and has mailed its shareholders dividends of \$2,308,317 this year. To date Amalgamated has declared dividends of \$56,465,700, the last quarterly being at the rate of \$2 per share per annum; the issued capitalization is \$153,887,900. Second place is given to the American Smelters Securities Co., which is affiliated with the so-called "smelter trust"; it has declared dividends of \$1,890,000 this year (equivalent to 6% per annum on the A preferred stock and 5% on the B preferred), making a grand total of \$8,445,000 on the outstanding capitalization of \$47,000,000.

One metal selling company, the United, which markets the product of the Amalgamated and other large concerns, is capitalized at \$5,000,000 and has paid dividends of \$875,000 so far this year, making a total of \$6,500,000 since 1900.

The copper properties head the dividend list, and may be expected to continue to do so indefinitely, if for no other reason than that their capitalizations are far below those of the better known gold mines. In eight months this year 16 copper properties distributed among the holders of their \$79,025,000 stock the surprisingly large total of \$10,743,730 in dividends. Since their organization these 16 copper mines have handed to their thousands of stockholders no less than

\$309,293,544, or four times the amount of their outstanding capitalization.

The banner copper mine is the Calumet & Hecla, judging by its past record, for since its incorporation in 1871 it has yielded dividends amounting to the enormous total of \$106,850,000 on an authorized capitalization of only \$2,500,000. In the current year Calumet & Hecla has paid dividends of \$1,000,000, the June quarterly being at the rate of \$30 per \$25 par value share per annum, or about 3% on a market quotation of \$675.

Anaconda of Butte, capitalized at \$30,000,000, has a dividend record of \$40,500,000 since its organization in 1895, and for eight months of 1908 it declared \$1,800,000, which is equivalent to \$1.50 per \$25 par value share, or about 3% on a market quotation of \$49. Boston & Montana, also of Butte, in 21 years paid dividends amounting to \$38,375,000, which is equivalent to nearly 16 times the authorized capitalization of \$3,750,000. In the current year Boston & Montana has declared dividends of \$1,850,000, or \$9 per \$25 par value share. Another famous copper mine is the United Verde of Arizona, which since its incorporation in 1899 has paid dividends of \$26,695,322 on a \$3,000,000 capitalization. This year the United Verde announced dividends of \$1,800,000, equivalent to \$6 per \$25 par value share. The Calumet & Arizona has a unique record, for it is credited with the payment of \$10,000,000 in dividends in seven years, showing a return of \$50 per \$10 par value share. In 1908 the Calumet & Arizona declared dividends of \$700,000, the last quarterly being at the rate of \$4 per \$10 par value share per annum, or about 3% on a market value of \$125.

The higher prices for copper, and the expected increase in consumption in the near future, are factors that suggest the payment of larger dividends by these mines.

Thirty-seven gold, silver and lead mines, having an outstanding capitalization of \$100,849,065, are credited with total dividends to date of \$86,251,741, of which the amount for 1908 is \$6,073,136. In the lead is the great Homestake low grade gold mine in the Black Hills of South Dakota; its monthly payments of 50 cents per share (par \$100 and market value \$90) so far this year aggregate \$873,600, making a grand total of \$16,953,350 to date. The capitalization of Homestake has been gradually increased to \$21,840,000. The Bunker Hill & Sullivan silver-lead mine in the Coeur d'Alene district of Idaho, capitalized at \$3,000,000, has paid dividends for the eight months this year amounting to

\$660,000, making a total since organization of \$10,446,000. The Alaska Treadwell, another famous low grade gold mine, has returned in dividends to date \$9,435,000 on its \$5,000,000 capitalization. So far this year the Alaska Treadwell has paid its shareholders \$450,000, the last quarterly being at the rate of \$3 per \$25 par value share per annum. The Portland of Cripple Creek, capitalized at \$3,000,000, pays quarterly dividends of 4 cents per \$1 share, amounting to \$360,000 for three quarters in 1908 and has a record of \$7,987,080 since incorporation. The Camp Bird mine, also in Colorado and owned largely in England, divided profits of \$590,400 in eight months this year, making a grand total of \$4,111,704 since organization with an issued capital of \$4,100,000. Several of the mines that discontinued dividends last year have reentered the list. Among these is the Tonopah gold mine in Nevada, which paid a quarterly dividend of 25 cents per share (\$250,000) in July, making its grand total \$3,650,000, equivalent to over 3½ times its \$1,000,000 capitalization, since organization in July, 1901.

The prospects are that with the economic development of the newer gold properties of known merit in Nevada and other states the dividend payments in this group will be largely increased in the not distant future. It is unfortunate for the silver properties that the market price of the metal continues at a level which is unprofitable for many of them, but this situation may be expected to change for the better with a return of the demand for silver by India and China.

Six metallurgical works declared dividends of \$10,466,888 so far this year, making a grand total of \$91,583,768 since incorporation on an outstanding capitalization of \$223,972,850. At the top of this group stands the American Smelting and Refining Co., known popularly as the "smelter trust"; it pays quarterly dividends at the rate of \$4 per annum on its common stock, par \$100 and market quotation \$98.50 (Aug. 31), and 7½ per annum on its preferred shares, par \$100 and market quotation \$110 (Aug. 31). The total dividends paid by the "smelter trust" so far this year amount to \$4,625,000, making since organization (in 1899) \$47,206,553 on a capitalization that has gradually been increased to \$100,000,000. The United States Smelting, Refining and Mining Co., incorporated in March, 1906, and a competitor of the so-called "smelter trust" pays quarterly dividends at the rate of \$2 per \$50 par value common share (market quotation \$42, Aug. 31) per annum, and \$3.50

per \$50 par value preferred share (market quotation \$45, Aug. 31); so far this year the total dividends are \$1,802,041. Since the beginning the United States Co. has declared dividends of \$5,478,622, and today has an issued capitalization of \$1,846,650.

Summed up, the evidence collected by The Mining World justifies the opinion that during the next six months there will be a marked improvement in the earnings of mines and metallurgical works, with the result that the well managed properties will yield greater dividends.

### Our Foreign Trade.

To export domestic raw materials and manufactures of a value aggregating the great total of \$1,834,786,357 in the fiscal year ending with June last is sufficient testimony, we believe, to establish the reputation of Americans in the markets of the world. When we consider that it is but a few years since the exports of the United States began to overlap the imports, there is additional reason to feel proud of the accomplishment of the individuals and corporations whose enterprise promises even greater progress in the not distant future. Great Britain and Germany are aggressive competitors, it is true, but the perseverance of the American exporter is his dominant characteristic and it will continue to be the winning play.

For a period that has been subject to peculiar financial difficulties, the effects of which, we are glad to say, are gradually disappearing, the last fiscal year's export trade has been unusually active and profitable, no doubt. Of the \$1,834,786,357 worth of merchandise sent to foreign markets during the year, \$488,458,736 or 26.62% represented manufactures ready for consumption, \$262,220,655 or 14.29% manufactures for further use in manufacturing, \$556,645,693 or 30.34% crude materials for use in manufacturing; while the remainder was largely foodstuffs. In the fiscal year of 1907 the domestic exports showed a total value of \$1,853,718,034, as against \$1,717,953,382 in the previous 12 months.

Of the more important exports in the last fiscal year, machinery alone had a value of \$89,479,974, which is some \$13,000,000 more than was reported two years previously. Mining machinery is credited with a value of \$5,097,523, as compared with \$5,890,788 in the fiscal year of 1907. Pumps and pumping machinery had a value of \$3,334,115 in 1908, as against \$3,896,681 in 1907. Boilers and parts of engines went forward in the past fiscal year

to the extent of \$2,942,339, against \$3,054,633 in 1907 and \$2,484,068 in 1906.

A remarkably large business has been done in pipes and fittings, notably with Canada, Mexico, Cuba, British East Indies, Japan, Belgium, Great Britain and a number of other countries. The exports of pipes and fittings in the year ending with June last amounted in value to \$11,273,289, which compares with \$8,331,367 in 1907, and \$8,774,311 in 1906. Mexico's proportion of the past year's total was \$1,601,028, and Canada's \$1,737,835.

Manufacturers of instruments and apparatus for scientific purposes have experienced an improved foreign trade compared with two years ago. In 1908 these exports totaled in value \$11,578,010, as against \$13,661,455 in 1907 and \$10,887,774 in 1906. No less than \$6,754,217 worth of electrical appliances were exported in 1908, of which Canada received \$1,336,329; Mexico, \$628,235; Brazil, \$1,211,036; Great Britain, \$706,675; Japan, \$444,797; while Cuba, Central America, Australia, Continental Europe and a number of smaller countries also placed substantial orders with American manufacturers.

The total value of the exports of iron and steel (not including ore) for the past fiscal year is \$183,082,182, which contrasts interestingly with \$181,530,871 in 1907 and \$169,984,985 in 1906.

To be sure, the commercial metals, especially copper, contributed generously to the export total for the last fiscal year. Copper alone amounted in value to \$102,366,328, not including the \$3,506,183 that represented copper in manufactured form. In 1907 the copper exports were \$90,629,813 in ore, matte and metal, and \$5,970,885 in manufactures. The total value of copper exports in all forms in 1908 was \$104,064,580, which compared with \$94,762,110 in 1907 shows an increase of \$9,302,470 or nearly 10%.

Coal exports have greatly increased in the last fiscal year, the total value being \$39,355,759, as compared with \$34,727,762 in 1907 and \$28,216,376 in 1906. Of the 1908 exports Canada received coal to the value of \$30,342,647, as against \$27,022,470 in 1907; Mexico, \$2,713,474, against \$3,208,585, and Cuba, \$2,153,130 in 1908, against \$2,111,721 in 1907. Smaller quantities were shipped to Europe and other countries. There was also exported \$2,718,385 worth of coke, as against \$823,440 in 1907 and \$679,773 in 1906, principally to Canada and Mexico.

To enumerate all of the more important exports would be impossible here, if not impracticable; but let it suffice to say that the superior position of Americans in foreign markets is due not alone to their push, but also to their wisdom in advertising their wares.

# Improved English Gold Dredge in West Africa.

By FRANK C. PERKINS,  
Consulting Electrical Engineer.

It is a well known fact that gold dredges should be specially designed to suit the particular requirements of the place in which they have to work. An English 4-cu. ft. bucket gold dredge is seen in the accompanying illustration (Fig. 1); it is designed to dredge 25 ft. below water level and to elevate 30 ft. above, is fitted with screen and tables with apparatus to alter their inclination. Fig. 2 is a view of the same dredge taken from forward end, showing chain of buckets, while Fig. 3 illustrates the same dredge, taken from the top of the elevator, showing screen and tables.

Fig. 4 shows the arrangement of a small English prospecting bucket gold

*Construction of gold dredges, and advantages in operation compared. Good work done by small machines. Differences between a gold and a harbor dredge.*

*Coarse gold is easily saved by a cheap sluice box dredge.*

is working on banks above water level the height of the bank has to be added to the depth below making in many cases a

ceptional strength in the design to withstand these severe shocks.

It must also be understood that a gold dredge, usually works in sharp quartz sand, which when mixed with water grinds into the bearings of the tumbler, necessitating a special material being used for the bearings. It has been found from years of experience that only a special steel of the hardest possible nature will stand this severe grinding.

Apart from the gold saving plant, which is a study in itself, a gold dredge only as far as actually lifting the material consumed is of a very different nature to a harbor dredge.

It may be stated that a sluice box



Fig. 1. English 4-cu. ft. Bucket Gold Dredge.

dredge fitted with  $1\frac{1}{2}$ -cu. ft. buckets, capacity about 40 cu. yds. per hour, to dredge 10 to 12 ft. below water level, and is fitted with sluice. This dredge was designed for transportation in small pieces and everything is arranged to be bolted together to avoid riveting abroad, to allow of its being taken to pieces again.

A small 2 or 3-cu. ft. bucket dredge is noted in drawing Fig. 5, showing screen and tables, and arranged to dredge 1 ft. below water level and to elevate 14 ft. above.

It may be of interest to note that the mechanical points of difference in the design of harbor and gold dredges. It must be remembered that a harbor dredge works in mud, sand or gravel, taking off a few feet of surface and gradually deepening the channel, the dredge being moved forward as the material is dredged away.

Instead of scraping the surface, a gold dredge cuts down to bed rock to its full dredging depth and is then hauled gradually sideways, the buckets being kept on the bed rock where the gold lies in greatest quantity. There is, therefore, a great stress on the sides of a pontoon and particular stresses are set up in the ladder. By working the dredge in this manner a ridge (or what is technically called a face) is formed, which is 20, 30 or 40 ft. below the water level, according to the depth of the bed rock, and when a dredge

total height of 60 ft. of bank down which boulders fall on to the end of the ladder and lower tumbler, which necessitates ex-

dredge is the cheapest form of bucket dredge and is very efficient when the gold to be saved is coarse and easily saved;



Fig. 2. View of West Africa Gold Dredge. Showing Chain of Buckets.



but for saving fine gold it is necessary to have a dredge fitted with screen and tables; and if it is required to work into banks, an elevator is necessary to hoist the tailings. The height to which the

shown in Figs. 1, 2 and 3 has pontoons 88 ft. long by 30 ft. beam and 6 ft. 6 ins. deep, constructed of  $\frac{1}{4}$ -in. and  $\frac{5}{16}$ -in. steel plates with gantry and tumbler framing, both very strongly built into the

ute; therefore the total lifting capacity of the dredge will be about 2,500 cu. yds. per day, or 15,000 yds. per week, excluding Sundays.

It is held, however, that no dredge can be kept running continually in hard ground. At its full capacity only two-thirds of the above quantities should be allowed as an average, which will bring the figures down to 10,000 yds. per week. The whole of the gearing is constructed of Hadfield's cast steel, and the wearing parts, where the heavy wear takes place, such as the bucket pins, the bushes, top tumbler faces, and bottom tumbler shafts and bearings, are of Hadfield's manganese steel. The revolving screen (for screening the dirt) is 29½ ft. long, by 4 ft. diameter driven by cast steel gearing.

It is stated that the gold saving tables are of approved design, adopted by Cutten Brothers, in New Zealand, where they are saving gold so fine that it will pass freely through a sieve with 100 meshes to an inch. The inclination of the tables can be quickly and easily adjusted to suit any class of material to be treated. The tailings elevator, which is 60 ft. long, and provided with 88 steel trays, will stack the tailings to a height of 30 ft. above water level. It will be noted that it is driven from the top end by a fast-running steel wire rope, a device successfully used in New Zealand for many years past.

The winch is worthy of notice, as this is one of the more important parts of a gold dredge. It has six barrels and a surging drum so conveniently arranged that the winchman can either wind in six of the lines at the same time or any sin-

tailings should be elevated is one-third more than the total dredging depth, calculating from the top of the bank to bed rock. This form of dredging is shown in Fig. 5, and is made with buckets varying from 2 cu. ft. to 10 cu. ft. capacity.

Five dredges of English design were built for Tierra del Fuego, for the Rio Verde companies. They are all 5 cu. ft. bucket dredges, fitted with screens, tables and elevator, and have boilers for burning coal or peat, and are specially designed to work very hard cemented gravels and to withstand severe frost. These dredges have been most successful, working continuously day and night since they started without any stoppage for repairs, in spite of the fact that they have met with very large boulders.

Similar dredges were built for the Argentine and Tierra del Fuego Exploration Co., which is working in Tierra del Fuego. There is a 6-cu. ft. bucket dredge at work in Tierra del Fuego, dredging to a depth of 40 ft., which was built for the Rio del Oro Co. of Valparaiso. This dredge has worked continuously since it was started, averaging 101 hours per week, without stopping for any repairs whatever; and recovered £7,200 (\$36,000) worth of gold in four months.

In calculating the output of a dredge, the gearing is designed to give the required number of buckets per minute; consequently, the maximum capacity per hour is the number of cubic feet in the bucket, multiplied by the number of buckets per minute and by 60. In very soft ground a dredge can deliver its maximum capacity, but in average hard ground two-thirds of the full bucket capacity is the estimated average output.

The gold dredge for West Africa

pontoons and braced to stand the heavy strains incident to gold dredging.

It may be stated that the bucket ladder is 56 ft. long and very strongly built, car-

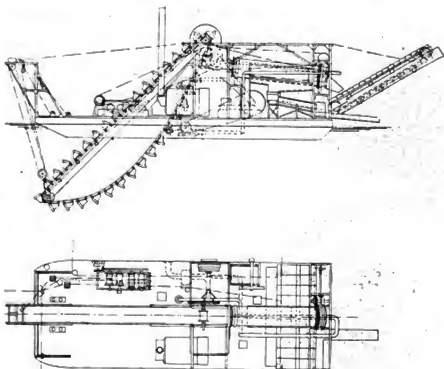


Fig. 4. Sectional Views of a Prospecting Gold Dredge.

rying 40 steel buckets, which have each a capacity of 4 cu. ft. and will dredge to a depth of 25 ft. below water. The buckets will deliver at the rate of 12 per min-

gle one separately, without the necessity of having to shift a number of dog clutches, as commonly used on many gold dredges. The enormous advantage of the

above, which lightens the labor of the winchman and enables him to treat a much larger quantity of material, can be fully appreciated by a person who has had practical experience in the actual working of gold dredges.

### Antimony in Queensland.

During the earlier part of the year 1907 Thornborough, Kingsborough, Woodville, and Northcote, in the Hodgkinson district, were centers of unwonted animation, and the development of the antimony lodes with which these localities abound for a time afforded a profitable occupation to a comparatively large number of men. A fall from £20 (\$100) per ton on the ground to less than £5 (\$25)

### World's Spelter Production.

BY C. E. SIBERTHAL.\*

The figures given in this preliminary statement of the spelter production of the United States in 1907 are based upon confidential reports by each zinc smelting company in operation. The totals for production of foreign countries are taken from the annual statement by Henry R. Merton & Co., London, and certain figures on imports and exports are taken from the reports of the Bureau of Commerce and Labor.

The total production of spelter in the United States in 1907 was 249,860 short tons, as against 224,770 tons in 1906; an increase of 25,090 tons, or 11.2%. The world's output was 813,842 tons in 1907, which compared with 775,871 tons in

apportioned according to locality in which the ore has been smelted, as follows:

	1906.	1907.
Colorado.....	6,260	35,308
East and South.....	29,930	37,626
Illinois.....	47,839	56,045
Kansas.....	12,544	134,108
Missouri.....	11,677	11,732
Oklahoma.....	.....	5,025
Total.....	224,770	249,860

The figures for production of spelter include only spelter derived directly from ore, and exclude all zinc obtained from secondary sources.

The world's production of spelter in the last two years was as below:

	1906.	1907.
Australia.....	1,121	1,098
Austria and Italy.....	11,883	12,222
Belgium.....	163,067	170,307
France and Spain.....	59,323	61,438
Great Britain.....	57,971	61,286
Holland.....	16,156	16,526
Poland.....	10,556	10,735
Rhine District.....	75,729	77,459
Silesia.....	150,282	152,611
United States.....	224,770	249,860
Total.....	775,871	813,842

The consumption of spelter in the United States was as below, in short tons:

	1906.	1907.
Supply—		
Stock, Jan. 1.....	3,463	3,824
Production.....	224,770	249,860
Imp. for consump.....	5,043	1,761
Total available.....	233,276	255,445
Withdrawn—		
Stock, Dec. 31.....	2,824	26,364
Exports, foreign, in bond.....	1	9
Exports, domestic.....	4,670	563
Total withdrawn.....	8,495	26,936
Apparent dom. consump.....	224,781	228,509

The increase in the domestic consumption of spelter in 1907 was 6,728 tons or 5%.

### Packing for Far East.

Consul Jacob E. Conner, of Saigon, Cochinchina, reports it has been noticed in Manila that there has been a very gratifying improvement during the last 12 months in the packing of goods imported by the Philippines from the United States. While it is not yet all that it may be, it is observed that more care is shown in the selection of stock for the casings. This is sometimes reinforced, as it always should be, with strap iron bands. The necessity for this is apparent to all who have watched the methods of handling, and especially trans-shipping freight by means of coolies. These, with a bamboo pole and piece of rope, carry in a most precarious fashion practically all sorts of merchandise brought to this region, and the package is liable to drop and burst at any moment.

Another improvement noted is in the making of uniform packages instead of placing a number of miscellaneous articles in the same case.

Gravel terraces on the Seward Peninsula, Alaska, are wide, flat gravel benches whose surface is considerably above the high water level of the stream but whose bed rock is only slightly, if at all, higher than the stream bed.

Platinum imports into Great Britain in 1907 were 24,797 ozs., as against 40,817 ozs. in 1906; a decrease of 15,520 ozs.

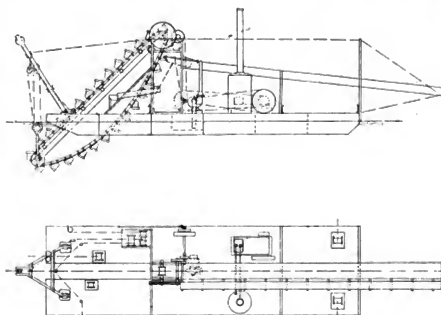


Fig. 5. Gold Dredge With Screen, Tables and Elevator.

was, however, too severe to be withstood, and in July, 1907, all production ceased. Nor is it at all likely that much attention will again be paid to antimony mining on the Hodgkinson until a substantial improvement occurs in the market value of the metal.

According to the last annual report of the under-secretary for mines, the Mitchell River Gold & Antimony Co. is erecting a plant for the treatment of the antimony-gold ore which occurs in its property on the north bank of the Mitchell river, near its confluence with the Watson. The process is described as simple and inexpensive, and the proprietors hope that the gold in the ore will more than pay the cost of production and treatment.

During the earlier part of last year 83 tons were hoisted from the Freehold and adjoining Crown land at McKonkey's creek, on the Connabula Run, in the Burnett district; the Mount Wellington mines, at the head of Four-mile creek, on the Ravenswood field, produced 35 tons, and a few tons are credited to Kilkivan and Kangaroo Hills, but in all of these places antimony mining has for the present been abandoned.

1906 shows an increase of 37,771 tons or 4.9%.

The table below apportions the output of spelter according to source of ore:

	1906.	1907.
Arizona.....	64	77
Arkansas.....	1,801	1,911
California.....	.....	140
Colorado.....	32,456	26,077
Idaho.....	573	3,508
Illinois.....	282	1,446
Iowa.....	201	229
Kansas.....	3,902	19,850
Kentucky.....	335	358
Maine.....	1	1
Missouri.....	130,348	141,824
Montana.....	1,415	0
Nevada.....	1,788	1,632
New Jersey.....	11,296	13,572
New Mexico.....	555	136
Oklahoma.....	.....	719
Tennessee.....	124	181
Texas.....	8	16
Utah.....	2,449	1,272
Virginia.....	1,143	771
Washington.....	7	0
Wisconsin.....	11,005	15,573
Total domestic.....	199,694	223,745

Foreign—		
British Columbia.....	201	545
Mexico.....	24,875	25,570
Total foreign.....	25,076	26,115
Grand total.....	224,770	249,860

The spelter output in this country is

\*Advance statement of U. S. Geol. Survey.

# Expanded Metal for Reinforced Concrete Work.

The tendency of the day in reinforced concrete work is towards unit systems.

That is, systems in which no mistake can occur in the placing of the reinforcement by reason of the ignorance or carelessness of the labor employed. Shop fabricated reinforcement is insisted upon in many specifications, and certain cities require the reinforcement of some elements of the structural part of reinforced concrete buildings, to be assembled in place before being brought on the work.

ERNEST M'CCULLOUGH.

In slab work for roofs and floors the greatest number of mistakes occur because the measuring and spacing of rods and bars is a tedious back-breaking process and is not always properly attended to. It generally requires the attention of a man with some brains to assemble reinforcement in columns and beams so there is not such great danger there, but in floor slabs where the greatest danger exists, the cheapest labor is placed.

In preparing for his everyday use in designing diagrams and tables, the writer attacked the slab problem first and presents herewith two tables for use with expanded metal that he trusts may be of considerable service to men away from places where skilled designers can be obtained. These tables will be of service as well to skilled designers. The writer is preparing other tables as an extension of these published now, and will be glad to furnish blue-prints to readers of *The Mining World* upon request. Blue printing is cheap and postage on blue-prints is not high, and if any parties interested care to send the small amount necessary to cover blue printing and postage the writer will be very glad to accommodate them. He would be willing to make a free offer, but the cost of blue printing and postage in the aggregate would be high if many requests came in.

Of course, expanded metal is only one form in which slab reinforcement in mesh form is manufactured, but the writer took up expanded metal first because after some experience with it he concluded it was practically ideal for the purpose intended. The diamond shape of the mesh distributes stresses to all parts of the slab perfectly and the cross bond is perfect. Every square inch in cross section is available for reinforcement and there is nothing extra for cross bonding as in the case of loose rods or wire mesh with rectangular openings. The mechanical bond of expanded metal cannot be surpassed by any form of reinforcement in the market.

The tables herewith show at a glance their purpose. Look for the span intended to be covered with the reinforced concrete slab. Trace down the column until the live load is found. Go to the left

By ERNEST M'CCULLOUGH,

Civil Engineer.

*Why mistakes occur in slab work for roofs and floors. Tables for ready calculation of weight and span in expanded metal concrete construction.*

*Discovery and advantages of expanded metal. Composition of a good concrete.*

and there find the thickness of the slab. In all cases the thickness of slab given is the total thickness, of which  $\frac{1}{2}$  in. is under the steel. The load under the span added to the weight of the slab itself makes the total load the slab can carry with a factor of safety of 4 in the concrete for slabs less

cu. ft. of clean, coarse sand and 4 cu. ft. of clean broken stone or gravel, the largest piece of which can go through a  $\frac{1}{2}$ -in. mesh. If ready mixed bank gravel, containing practically the right amount of sand, is used, take 4 cu. ft. to one bag of cement to obtain the same strength. If a mixture of one bag of cement, 3 cu. ft. of sand and 5 cu. ft. of stone or gravel be used the strength of the slab will be about 20% less than is given in the tables. If the best quality of cinders be used and are properly mixed the strength will be only about one-quarter that given in the tables.

The tables are figured for stock sheets 3 ft. wide with 3 in. side lap. The designation of the mesh is that adopted by the Chicago company manufacturing expanded metal. The diamond is 3 ins. wide and about 7 ins. long. The metal is United States standard gauge No. 10, before ex-

TABLE I.

3-in. No. 10 Gauge Single Strand Sheet, 3 ft. wide, 3 ins. sidelap.

Total Thick- ness of slab	Thick- ness of concrete below steel	Weight of slab per sq. ft.	M = $\frac{1}{4}$ wp Span in Feet.												
			2'	2' 6"	3'	3' 6"	4'	4' 6"	5'	5' 6"	6'	7'	8'	9'	10'
2 1/2	1/2	24	480	300	209	140	100	75	55	42	32	24	18	14	11
3	1/2	31	620	430	290	210	150	110	81	64	49	38	29	22	17
3 1/2	1/2	37	900	560	350	270	200	150	110	87	67	49	40	31	24
4	1/2	42	1000	600	370	290	220	160	120	96	72	54	42	33	26
4 1/2	1/2	49	1080	660	400	320	240	180	130	100	76	58	45	35	28
5	1/2	54	1180	740	460	360	280	210	150	110	84	64	50	39	31
5 1/2	1/2	61	1280	800	500	400	320	240	180	130	100	76	60	47	37
6	1/2	68	1380	860	540	440	360	280	210	150	110	84	64	50	39
6 1/2	1/2	75	1480	920	580	480	400	320	240	180	130	100	76	60	47
7	1/2	85	1580	980	620	520	440	360	280	210	150	110	84	64	50
7 1/2	1/2	92	1680	1040	660	560	480	400	320	240	180	130	100	76	60
8	1/2	100	1780	1100	700	600	520	440	360	280	210	150	110	84	64
8 1/2	1/2	108	1880	1160	740	640	560	480	400	320	240	180	130	100	76
9	1/2	122	1980	1220	780	680	600	520	440	360	280	210	150	110	84
9 1/2	1/2	135	2080	1280	820	720	640	560	480	400	320	240	180	130	100
10	1/2	147	2180	1340	860	760	680	600	520	440	360	280	210	150	110
10 1/2	1/2	159	2280	1400	900	800	720	640	560	480	400	320	240	180	130
11	1/2	171	2380	1460	940	840	760	680	600	520	440	360	280	210	150
11 1/2	1/2	183	2480	1520	980	880	800	720	640	560	480	400	320	240	180
12	1/2	195	2580	1580	1020	920	840	760	680	600	520	440	360	280	210

TABLE II.

3-in. No. 10 Gauge Double Strand Sheet, 2 ft. Wide, 3 ins. Sidelap.

Total Thick- ness of slab	Thick- ness of concrete below steel	Weight of slab per sq. ft.	M = $\frac{1}{4}$ wP Span in Feet.												
			2'	2' 6"	3'	3' 6"	4'	4' 6"	5'	5' 6"	6'	7'	8'	9'	10'
Lands in Pounds per Square Foot.															
$2\frac{1}{2}$	$\frac{1}{2}$	43	300	680	510	280	210	250	290	140	94	65	45	38	17
3	$\frac{1}{2}$	49	360	820	640	340	260	300	340	170	110	77	57	48	21
$3\frac{1}{2}$	$\frac{1}{2}$	55	420	960	750	400	300	350	390	190	130	97	68	57	25
4	$\frac{1}{2}$	61	480	1100	860	440	330	380	420	210	140	100	70	60	27
$4\frac{1}{2}$	$\frac{1}{2}$	67	540	1240	960	500	380	430	470	230	160	110	80	68	30
5	$\frac{1}{2}$	73	600	1380	1060	560	440	480	520	250	180	120	88	76	33
$5\frac{1}{2}$	$\frac{1}{2}$	79	660	1520	1160	620	500	540	580	270	200	140	100	88	36
6	$\frac{1}{2}$	85	720	1660	1260	680	560	600	640	290	220	160	110	98	39
$6\frac{1}{2}$	$\frac{1}{2}$	91	780	1800	1360	740	620	660	700	310	240	180	130	110	42
7	$\frac{1}{2}$	97	840	1940	1460	800	680	720	760	330	260	200	150	122	45
$7\frac{1}{2}$	$\frac{1}{2}$	103	900	2080	1560	860	740	780	820	350	280	220	170	138	48
8	$\frac{1}{2}$	109	960	2220	1660	920	800	840	880	370	300	240	190	150	51
$8\frac{1}{2}$	$\frac{1}{2}$	115	1020	2360	1760	980	860	900	940	390	320	260	210	166	54
9	$\frac{1}{2}$	121	1080	2500	1860	1040	920	960	1000	410	340	280	230	182	57
$9\frac{1}{2}$	$\frac{1}{2}$	127	1140	2640	1960	1100	980	1020	1060	430	360	300	250	198	60
10	$\frac{1}{2}$	133	1200	2780	2060	1160	1040	1080	1120	450	380	320	270	214	63
$10\frac{1}{2}$	$\frac{1}{2}$	139	1260	2920	2160	1220	1100	1140	1180	470	400	340	290	230	66
11	$\frac{1}{2}$	145	1320	3060	2260	1280	1160	1200	1240	490	420	360	310	246	69
$11\frac{1}{2}$	$\frac{1}{2}$	151	1380	3200	2360	1340	1220	1260	1300	510	440	380	330	262	72
12	$\frac{1}{2}$	157	1440	3340	2460	1400	1280	1320	1360	530	460	400	350	278	75

Designation.	Weight per sq. ft.	Total Thickness of Slab inches.	M = $\frac{1}{4}$ wp Span in Feet.					
			1 ft.	1 ft. 6 in.	2 ft.	2 ft. 6 in.	3 ft.	3 ft. 6 in.
2 1/2 in. ....	29	1 1/4	15	270	110	55	30	14
No. 16 ....	29	1 1/4	18	240	230	120	72	44
3 in. ....	29	1 1/4	21	210	250	130	80	48
3 1/2 in. ....	29	1 1/4	24	240	100	50	26	13
No. 16 ....	20	1 1/4	18	490	170	86	46	28
4 in. ....	20	1 1/4	21	530	220	120	67	40

than 6 in. thick. The factor of safety in the steel is 3 if we count to the elastic limit, which should be done, but if we go beyond that then the strength of the concrete will govern. For slabs more than 6 ins. thick the concrete stress is very low, so the steel governs on the thick slabs.

The concrete is assumed to be composed of one bag of Portland cement, 2

panding. The process of expanding stretches the steel and raises the elastic limit, thus reducing the gauge thickness. The area per 12 in. width across the narrow part of the diamond is 0.163 sq. in. for the single and 0.324 in. for the double strand. The weights per square foot are 0.55 lb. and 1.07 lb., respectively. These are stock cuts, but for special orders the

width of the strand can be varied so that any desired area per 12 in. width can be given with corresponding weight per square foot. This fact is not generally known for all the literature so far published by the expanded metal companies makes no mention of it, with the exception of the Chicago company.

Expanded metal was invented by James F. Golding over 20 years ago to make fences. It has since been used for every purpose for which wire mesh is commonly employed, and the uses are increasing. Within the past 10 years its use in reinforced concrete work has been phenomenal. It comes in sheets that cost very little to place, and it is truly "fool proof" reinforcement.

The writer found some curious things in his search for information about this form of steel reinforcement. For instance, he learned that expanded metal made by the eastern companies has a diamond of a different shape from that of the Chicago company that controls all the territory west of Ohio. The eastern diamond is broad as compared with its length, and the connecting area is rather long. This gives it a 6-sided shape, and the material is so distorted in stretching that the sheets are all annealed after expanding so that the elastic limit is reduced to the original amount of 30,000 lbs. per sq. in.

The fabric is made only by the Associated Expanded Metal Companies. Other companies in the United States having "expanded metal" as a part of their trade name are jobbers only. The Chicago company has machines of a somewhat different type from the other companies so that the diamond is perfect and the material is so slightly stretched during expanding that the elastic limit is raised to practically 50,000 lbs. per sq. in., and it is not necessary to anneal the material. This is the basis then on which the accompanying tables are computed. In using expanded metal made by other companies the writer would reduce the loads one-third to maintain the same factor of safety, or increase the amount of steel.

In England and Italy heavier expanded metal is made than in the United States, so it is used more widely. In Italy the government has made barges and boats of different kinds from concrete reinforced with expanded metal, for it is deemed to be an ideal reinforcement. For sustaining concentrated loads expanded metal is excellent.

### Machine Mined Coal.

Ohio leads all other coal producing states in the percentage of the total product which is mined by machines.

There were 1,328 machines in use in 1907, and the machine mined product amounted to 24,843,616 short tons, or 77.29% of the total output. In 1906 there were 1,255 machines in use, and the machine mined product was 20,004,416 tons, or 72.14% of the total output. In 1905 there were 1,041 machines in use, which mined 16,888,417 tons, or 66.1% of the total.

Tin ore imports into Great Britain for seven months amount to 15,559 tons.

### The Peace River-Yukon Trail.

BY W.M. FLEET ROBERTSON.\*

For the last two years the Royal North-West mounted police have been engaged in making a trail from Fort St. John, on the Peace river, across British Columbia, via Fort Graham and Fort Connelly, to the Yukon telegraph line, which is then to be followed, with certain local variations, to Telegraph Creek, Atlin and White Horse in the Yukon.

As the cutting out of this trail renders a section of the northern part of the province more available to prospectors and others, the following particulars of the trail are given.

From Edmonton a good wagon road leads to Athabasca Landing—a distance of approximately 100 miles—over which a stage runs twice a week, also numerous freight teams. There are excellent stopping houses on the road and a good hotel at the Landing. The Hudson Bay Co. and Revillon Freres have large stores at the Landing, where ordinary supplies can be obtained.

From Athabasca Landing travel in winter is by sleigh road up the river on the ice to the mouth of Lesser Slave river, which is then followed up to the lake of the same name, to the Lesser Slave lake post of the Hudson Bay Co.

In summer there is a steamer running on the Athabasca, from the Landing up to Lesser Slave river, from which point to Lesser Slave lake post travel is up the river and lake by canoe or York boat, or, after leaving the steamer, horses can be taken over the trail following the north bank of the river and lake to the post. The distance from the Landing to Lesser Slave lake post is about 200 miles. At the post there are a couple of good stores, etc., run by the Hudson Bay Co. and Revillon Freres. There is considerable settlement in this vicinity and a large half-breed colony, so that horses and packing outfit can usually be obtained here.

From the post to Peace river crossing is a distance of about 100 miles over a rather poor wagon road. At the crossing there are two stores, and a North-West mounted police barracks. The Peace river is crossed by a ferry and the road continues along the north side of the river to Dunvegan and on to Fort St. John, a distance of 180 miles.

Dunvegan is the best point to leave the wagon road, for the Pouce Coupé country in British Columbia, as a few miles south of the river, opposite Dunvegan, there is the half-breed settlement of Spirit river, where horses can be obtained, and from where to the Pouce Coupé prairie there is a good trail and possible wagon road.

Fort St. John is the first place met with in British Columbia coming from Edmonton, and here is located a deputy mining recorder's office, where free miner's licenses may be obtained and claims recorded. The police trail really only begins at Fort St. John, as the road to this point has been built for some years.

Leaving Fort St. John, the trail leads westward up the north side of the Peace

river for 22 miles to the mouth of Cache creek, which it follows up to the north-west for 22 miles, when it crosses the north branch of the Halfway river. It then follows up the main Halfway river, now on the bench, now in the valley, to the junction of the Cypress river, 97 miles from Fort St. John. Here it turns westward, following up the valley, and enters the first range of mountains (Rocky Mountains) at the 114-mile post, and, by an easy grade, crosses the range through Laurier pass.

It now drops rapidly, crosses Ottertail creek above the forks and, mounting a low ridge, dives into a small valley, entering immediately the gorge of a small stream flowing from the west; this it follows up, crossing and recrossing the bed of the stream. Leaving this stream on the right, it climbs upward for 1,000 ft. to the summit of the second range, known as the Devil's canyon, 154 miles from St. John.

It soon drops again, by a steep descent, into the valley of a westward flowing stream, the bed and banks of which it follows down, with a mile or more of rough going, when the trail improves, until the crossing of the Ospika river—at 172-mile post—is reached, when it commences a long, steady climb to the summit of the third range—Herchmer pass—180 miles from St. John.

From Fort Graham it is 20 miles to the mouth of the Ingenika river, on which recent finds of placer gold are reported. At Fort Graham the Hudson Bay Co. has a post at which ordinary camp supplies can usually be had, but it is better to learn from the company's head office in Victoria as to the stock on hand this season, before counting on supplies at Fort Graham.

From Fort Graham, the distance to Fear lake (Fort Connelly), is 116 miles in a general south-westerly direction. In that distance the trail crosses three mountain ranges, the first and second by easy grades and at no great elevation, but the third range is crossed at an altitude of 7,000 ft., by barometer, some 2,000 ft. above the valley of the Omineca, the climb being made in six miles. Fort Connelly has been abandoned as a trading post and no supplies are to be obtained there.

From Fort Connelly to the line of the Yukon Telegraph trail is 33 miles, in a westerly direction, the trail meeting the Telegraph line four miles north of the "Fourth Cabin," which is 100 miles from Hazelton. This stretch of trail is said to be very good. Hazelton is the head of steamboat navigation on the Skeena river. It is the seat of the gold commissioner and mining recorder of the district, and has three or four stores where supplies of all sorts can be obtained; three hotels, postoffice, telegraph office, hospital, etc. Steamboat navigation opens on Skeena river about May 1 and closes about end of October—both dates depending somewhat upon the season and state of water in the river.

The Canary islands imported 681,000 tons of coal last year, principally from Great Britain.

\*Provincial mineralogist, Victoria, B. C. Extracted from Report of Bureau of Mines for 1907.

# Property and Plant of Right of Way Company.

By ALEX GRAY.

To mine four miles of a 99-ft. railway right of way, with a bite out of the route in the immediate vicinity of the Cobalt depot, has elements of novelty exacting skill and ingenuity. This is what the Right of Way Mining Co. has been doing for two years—and doing it at such profit that the gross and net earnings eloquently amplify the capabilities of a strip of Cobalt country, when the silver ribands are on exhibit in the calcite matrix.

Ordinarily a tortuous 99 ft. would be too much to tempt the most adventurous, unless there was something very alluring. In this instance it happened that surveyors' lines, sharp angles at the north end of Cobalt Lake, and the railway set aside a 6-acre area just where the silver filled fissures were well defined, and enabled the Right of Way Co. to have an effective knob on the end of its crooked stick with which to belabor those who thought its promoters were clean, stark, raving crazy for having agreed to pay 25% of the gross receipts as royalty to the Temiskaming & Northern Ontario railway,

*A novel mining venture, which has yielded large profits. Work done on the property shows shipments of 1,000 and 2,000-oz. silver ore. Joint mining operations of Right of Way and Chambers-Ferland. Ingersoll,*

*Sullivan, Cleveland and Murphy drills. Ames boilers. Ingersoll-Hoist-gear compressor. Lidgerwood-Sargent Robb Armstrong engine. Bullock generator.*

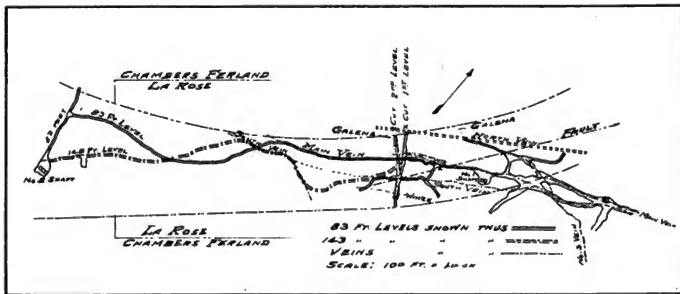
Temiskaming & Northern Ontario Railway; received \$315,556 gross, and \$235,667 net.

From a drift and small stope about 115 ft. by 20 ft. the La Rose Co. erroneously mined rock which experts and a court valued at \$167,000. As a compromise, the Right of Way should soon receive

Townships of Quebec and at Sudbury, discreetly said:

"That is something it is difficult, if not impossible, to estimate with any degree of accuracy satisfactory to yourself or myself. Reasoning from what we have taken out of a small portion of our ground above the first level, from what you have seen, and from what we have just struck this week in the second level, you may guess as closely as 1. The second level is as rich as anything we have on the first. Double or treble the figure to date, as you see fit—and then you may be out of it."

Reference to the accompanying plan of the Right of Way workings confirms the inferential optimism of Mr. Houston. Economical conditions prevail in that the railway traverses the triangular plot. Two shafts have been sunk and a winze, all told to June 30 there has been 336 ft. of sinking, 1946 ft. of crosscutting and drifting, and 86 ft. of raising, beside providing a model plant suitable for the area. That this footage may be given



Plan of Underground Workings of Right of Way Mine.

besides \$50,000 on the spot before the company could put a pick in the ground. The transaction was characteristic of Cobalt in its Utopian era when calcite and bloom unshackled the imagination of the otherwise improvident, if not inept. Even then the initial payment and royalty, notwithstanding the arrangement really amounts to a case with a bonus precedent, was regarded as a sort of introduction to "over the hills to the poor-house."

One carload extracted from a surface cutting on the Right of Way, about 500 ft. from the La Rose shaft and from the La Rose main vein, reimbursed the Ottawa promoters of the railway mining project and gave impetus to an enterprise, now ably managed by Joseph C. Houston, that has paid to June, 1908, 29.99% in dividends; paid \$78,889 to the

\$163,000. With this sum, added to the \$125,000 or thereabouts on hand besides the \$104,898 paid out in dividends to June, 1908, the Right of Way will have almost \$390,000—two-thirds of its capital—without touching its second level and encroaching upon its first level reserves to any great extent. The potentialities of some of these Cobalt sections become impressive. For the first six months of 1907 the gross receipts amounted to \$110,000, but they will probably total \$250,000 for the twelve months. Taking the sum assessed against the La Rose, therefore, and the gross receipts as obtained from the books through the courtesy of Mr. Houston and his directorate, the mine has almost cleared its capital. Of the future, Mr. Houston, who has had wide experience in Kansas, Missouri, Colorado, the Klondike, Lake of the Woods, Eastern

the importance it deserves these figures are submitted:

	Crosscutting.	Sinking
Total for 1906.....	225	24
Total for 1907.....	425	181
Total for 1908 (6 mos.).....	1,521	173

From development and what little stopping was done during the past six months 211 tons were shipped. As the books show, the gross receipts therefrom have been \$110,000, it follows that this "Mrs. Wiggins' Cabbage Patch," that raises nothing but rocks however, is regularly shipping an average of \$21.32 per ton 1,000-oz. ore. From the beginning to July 1, this year, 379 tons were sent away; and having the gross receipts at \$315,556 the average per ton value must have been \$32.60, or little short of 2,000 oz. silver allowing for losses and treatment. Another 100 tons in July brings the grand

total shipped to 470 tons; so that the gross receipts when these are accounted for will be at least \$360,000 to \$370,000 without trespassing upon the futurities and exclusive of the La Rose \$163,900.

About 360 ft. of the main vein has been driven on, and it is this vein which the La Rose has for a further 900 ft. Bearing in mind that there is a distance of 600 ft. between the shafts, and making all due allowance for what the mine does not seem to have in its southeastern half, the management has one of the soundest propositions Cobalt has or can produce. A seemingly secondary fault intersects all the veins without affecting their values.

No. 3 vein has exceptional enrichments which may or not have correspondingly impoverished one or two of smaller dimensions near by; but these eccentricities are immaterial to the general aspects of the mine, which is being admirably exploited, crowded as it is between the La Rose-Chambers-Ferland side lines on the east and a diabase contact on the west, which evidently was the disturbing factor incident to the fissuring and special enrichments of the locality. On that contact, it should be explained, there is a galena vein that may develop into an asset worth having. It was first noted in the north vein, west drive, where it was comparatively low grade. Lately it was picked up on the second level at the end of the crosscut from the winze, and there it is about 18 in. wide, assaying 60% lead and 40 ozs. silver. Of the main vein there is about 600 ft. of it in the Right of Way ground. To the west it is deflected into the La Rose and Chambers-Ferland and may enter one of the Nipissing blocks or swing around into Cobalt Lake. The plan is to extend the crosscut north from No. 1 shaft so as to determine where the main vein is on Chambers-Ferland. This co-operative feature, the work to be done by the Right of Way and paid for by Chambers-Ferland, is a pleasing departure in Cobalt practice. Further south, where the railway right of way is known to have 99 ft. of some of the Silver Queen's high grade ore, a shaft is being sunk to get at 6 ins. carrying 2,500 ozs. silver. Apart from the main area this is the only work thus far attempted on other sections.

Where the conduct of Right of Way affairs has specially excelled is in mining methods. Mr. Houston having established standards in low costs. His drifting and crosscutting have been done with 3-in. Ingersoll machines, using 95 lbs. of 3-in. Each round is given 11 to 13 holes, 3 to 6 ft. deep and usually nets an advance of from 4 to 5 ft. in a 4 ft. by 6 ft. 4 in. drive or crosscut. This entails two setups on each round, the day shift mucking back, setting up and taking out the cut, and the night shift mucking back and squaring up. Mr. Houston adopted this course because of the hard ground, after experimentation. He has found it gives him a greater footage per month for less explosives, besides equalizing the work on each shift.

In the hard ground of the camp, Mr. Houston's experience demonstrated that one missed hole usually spoiled a round if fired simultaneously, whereas if only the cut is shot, the following shift can

re-blast part of it and still complete their shift. This procedure enables the management to record the gratifying fact that it has rarely lost the benefits of a shift. In crosscuts, bottom holes are the rule; in drifting side cuts have proved most effective. Air hammer drills are now exclusively in use—the Cleveland, Sullivan and Murphy—and Mr. Houston holds that these machines will reduce mining costs in any camp. With one hammer drill he says he is doing as much execution as he did with two piston drills, including time consumed in setting up, with less air, and very little more than a quarter of the labor cost. The admitted disadvantage in the types of hammer drills is in the repairs, which are higher than for piston machines, but modifications constantly being made will solve this objection. Nor is Mr. Houston alone in this judgment.

The Right of Way management carries its raises just wide enough to take out the vein, from 2 to 3 ft. and 4 to 8 ft.

a shaft 6 ft. by 14 ft., \$34 per ft., including timbering.

The Right of Way plant includes two 100-hp. Ames Iron Works boilers; one 8-drill cross-compound, 2-stage Ingersoll-Sargeant compressor; one double drum 8½ by 10 Lidgerwood hoist; one 5 by 6 Robb Armstrong vertical high speed engine for running; 6 kw. Bullock generator for lighting purposes. The buildings include superintendent's residence, shaft house, ore houses, boiler and engine houses, blacksmith shop, stores, offices, and sleeping and dining camps.

### Coal in the Mediterranean.

Reverting again to the great demand for coal by the Mediterranean seaports, Consul-General Robert P. Skinner, of Marseille, makes the following suggestions for the solution of the freight problem involved in the trade:

There is a market in Mediterranean sea ports for standard American coal



Surface Buildings of Right of Way Co.

long, and in one instance drove for less than \$4 per ft. No timber is used in the stope. One stope is broken down on the drift, the hitches cut on the dirt, and the stulls put in, 6 ft. center to center, lagged over along the middle over the track. In this way a chute can be opened at any point in the stope, and if it clogs, the men move along a few feet and open another, only enough of the broken rock is taken out to give the men working room until the stope is finished. Then the rock is drawn and passed over the picking tables, but first there is a thorough sorting in the stope. As high as 95% of the ore has been sorted there, and it is a matter for congratulation where handling charges are so excessive as at Cobalt, that what passes over the tables often will run less than 15 ozs. silver, and can be treated in the concentrator. So much for clean mining, where the average Right of Way costs for cross-cutting and drifting since Jan. 1 were \$10.40 per ft., winze sinking including timbering \$28 per ft., and shaft work in

if it can be laid down on this side on terms very slightly better than those of English shippers. Marseille has received and marketed 250,000 tons of American coal in one year. But under more active home trade this market was neglected.

Ultimately, American coal will come to this market in large quantities, but the problem will not be solved until either the miners of our coal or the American railroads make the ocean freight rates themselves. The enterprise should be undertaken upon a large scale, vessels being secured under long-time charters or owned outright.

Railroads of the United States might find it advantageous to give shippers the benefit of a low through rate to Europe for the sake of the land tonnage which they would obtain, and the steady influence of foreign markets to which coal could be shipped and stored during the dull season at home.

Zinc ore exports from Cartagena, Spain, for the first six months this year were 44,803 tons.

# Magnetic Separation at Calamine Works, Sardinia

By ERMINIO FERRARIS.\*

Metallurgist.

Middlings from the process of concentration at the calamine works at Montepioni, Sardinia, may be divided into two classes:

1. Mixtures of ores of too close a specific gravity to be easily separated at the first operation; for instance, cerussite and barite, blende and pyrite, calamine and limonite; or certain mixtures of sufficiently different specific gravity, but produced in the work of concentration, which are further treated either to remove a mineral which is found in the raw material in too small a quantity to be directly concentrated, or to take away from the waste all trace of useful mineral. Such are mixtures of galena with cerussite and barite, zinkiferous limonite and dolomite, as well as the ferruginous calamine and dolomite at the calamine mill of Montepioni.

2. Mixed minerals which require a previous breaking to separate them.

The mixtures of the first class are separated by stratification on the closed hydraulic jigs with one compartment, removing the products by hand, and layer by layer, as soon as stratified.

The fine-grained mixtures which contain waste are usually concentrated in a special section of the washery, provided with suitable classifying and separating apparatus.

Separation of the mixtures of the second class begins with crushing, more or less extreme, according to the nature of the material. The machines for crushing used in Sardinia are the stone breaker, the rolls and the ball mill. Of the first two types in Sardinia there is nothing special to be said.

The ball mills used are chiefly the Krupp and the Ferraris. The Ferraris wet ball mill possesses the advantages of great simplicity of mounting and small requirements of space and power for the same capacity. The steel plates which form the lining do not need to be adjusted, being held in place by the lateral steel walls and the sand formed by the crushing of the ores. There being no central shaft, large lumps of ore can be introduced into the mill, and workmen can easily enter for repairing and cleaning.

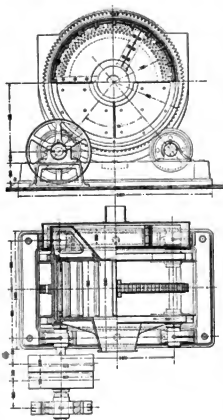
The mill is made in two forms: one for coarse grinding (from 5 to 15 mm.), the other for fine grinding (from 5 to 0.5 mm.). The following description of the first form may serve for both, except as the differences mentioned below.

The mill consists of a drum supported on four carrier-wheels and driven by a spur gear securely fixed to the drum, which engages with a spur pinion keyed to the counter-shaft. The drum is divided by an annular perforated partition into two compartments. The larger or crushing compartment is 61½ ins. in diameter by 30 ins. long. It is lined with manganese steel plates with projecting ribs, and contains about 1,000 lbs. of forged steel balls 4 ins. and 6 ins. in diameter. The smaller or screening compartment, about 10 ins. in length, is divided

*Methods and machines used for preparing ores for separation of their metallic contents. Mixed products are calcined before magnetic separation. Cost of calcination.*

*Economic features of Ferraris ball mill. Krupp ball mill. Ferraris oscillating tables.*

ed into a series of pockets by means of a cone projecting into the crushing compartment, and a series of radial partitions extending therefrom. The periphery of this compartment is open, and is sur-



Ferraris Ball Mill for Fine Grinding.

rounded by a screen of the desired mesh. The material passing through the screen falls into a housing surrounding the lower half of the screening compartment.

The ore to be crushed is fed into the crushing compartment with the water, and, when reduced to pieces smaller than the holes in the annular partition, passes through into the screening compartment, where the material which is fine enough passes out through the screen, and the oversize is elevated by the radial partitions until it slides back on the surface of the cone into the crushing compartment, where it undergoes further crushing.

The drum is rotated at 20 revolutions

per minute, and requires 5 to 6 hp. at its full load. The capacity at this speed on quartzose ore, broken by crusher to pass through a 2-in. ring, is approximately: Mesh of screen, 12, 16, 20 and 30; capacity, in tons per 24 hours, 35, 30, 25 and 20.

The weight of the mill, including balls, is approximately 7.5 tons.

In this type, the peripheral plates are detached from the inner walls of the drum, leaving between them and the projecting bars a space of 12 mm., through which the water carries into the sizing compartment the grains below 12 mm. In the second or fine grinding form, illustrated herewith, the peripheral steel plates are close to the inner walls of the drum, and the water with grains below 10 mm. runs out through holes in the walls which divide the ball chamber from the sizing chamber. In both forms the screen is at the periphery of the sizing chamber, and the material rejected by the screen is raised by the radial partitions to the point where it can slip over the exterior surface of the cone and return to the crushing chamber.

A Ferraris ball mill requires 7 hp., with 20 revolutions per minute, and 80 liters of water per minute. The quantity crushed per hour depends on the quality of the ore and the size. In general, the product is greater from brittle ores like quartz than from tough minerals like diabase. A quartzite mineral in large pieces is crushed to 3 mm. at the rate of four tons in three hours, or 1.33 tons per hour. If the ore has been broken beforehand to 50 mm., 1.5 tons per hour can be crushed to an average size of 1.5 mm.

The broken ore is sent to the separating machines after having been sized, if a screen of more than 2 mm. in size is used. In this case the sizing is accomplished by the vibrating screen. If the crushing is pressed below 2 mm., hydraulic classifiers are applied to the pipe which carries the water and sand.

In the mill at Montepioni for the fine crushing of mixed ores, the first hydraulic classifier feeds a jig of five compartments; the others feed the Ferraris oscillating tables.

At the Rosas mine, there are five ball mills forming five sections. The ball mills receive the material which has been broken by the stone breaker to 2 ins. and crush it to 2 mm., at the rate of 1.5 tons per hour per mill. But diabase impregnated with blende and galena is found to be very difficult to crush.

Each section is composed of one ball mill, two jigs and three oscillating tables. There is one special section, composed of a distributing trunk, a classifying pipe, and eight oscillating tables, to treat the middlings from the five crushing sections.

The mixed products of the ores of zinc are treated by reducing calcination, followed by magnetic separation.

Calcination is performed in the well known Oxland cylindrical furnace, of 1.30 m. exterior diameter, 1 m. interior diameter, 10 m. length, and 6.2% slope. The furnaces make an average of 15

\* Extract from *Il-min.* Bull. A. I. M. E., May, 1908.

revolutions per hour, and serve to calcine the calamine below 15 mm. in size as well as the mixtures of calamine and iron, to be later separated by the electro-magnet. In preparing the mixtures for magnetic separation, 2% of reducing carbon is added to the ores.

There are three rotating furnaces, which gave, in 1906, the following results: Hours of work in the year, 15,800; weight of crude material introduced into the furnaces, 15,137.6 tons; weight of calcined product, 12,184.8 tons; total consumption of lignite, 2,296.85 tons.

It should be observed that the fuel is a lignite rich in ash, which gives 29% of clinkers; it is burned on a barred grate in a thick layer with injection of air and steam under the grate. The fuel is partly gasified, and the gas burns in the furnace with the air heated around the hearth and on the hot calcined charge which falls from the furnace.

A rotating furnace can calcine a ton of crude ore, and give 773 kgs. of calcined product per hour. The total fuel consumption is 145 kgs. per ton of crude ore, or 188 kgs. per ton of calcined product.

In 1906, the cost of calcination per ton of calcined product, was: Fuel, 3.2500 frs. (63 cents); hand work, 0.7376 frs. (14 cents); steam and motive power, 0.5000 frs. (9.7 cents); oiling and repairs, 0.2651 frs. (5 cents); total, 4.7527 frs. (91.7 cents). Per ton of crude material, 3.825 frs. (75.7 cents).

Preparations are in progress to install new revolving furnaces, which will have a tubular boiler between the furnace and the chimney, and thus avoid the expense for motive power and the injection of steam. In this case the calcination of a ton of crude ore will cost only 3.5 frs. (67.5 cents) at the most.

There are two installations of magnetic separators, one with six electro-magnets, rubber belts which carry the classified ore, and a large cross belt which removes the iron ore. In order to distribute the material to the six electro magnets, it is raised by a bucket elevator, and sized by a vibrating screen into six classes; that is to say, 0-0.5; 0.5-1; 1-2; 2-4; 4-6; and 6-10 mm. The material over 10 mm. is crushed and returned after crushing to the magnetic separator.

The distance between the belt which carries the ore and the poles of the electro-magnet varies from 20 to 40 mm. An apparatus with six electro-magnets treats on an average one ton per hour, and requires 2 hp. and a current of six amperes at 110 volts.

After separation from the iron, the zinciferous product is dressed on closed jigs to remove the calcined dolomite and the small amount of lead ore which it contains.

In 1906 one of these magnetic plants treated 6,373.97 tons of calcined material containing 25.98% of zinc. After separating the iron, and jigging, a marketable product was obtained of 2,354.12 tons with an average of 40.87% of zinc, representing 66.47% of the zinc in the original calcined ore and the removal of 17.31% of iron.

The remainder goes into the middling products, which are set aside, and into the tailings from the jigs.

The iron oxide contains 10% of zinc, which cannot be removed without resorting to chemicals. To enrich still further the valuable calcined calamines, single and portable magnetic separators are used.

One of these drum separators takes two amperes at 110 volts, and treats between 500 and 600 kgs. of material per hour.

Another, with scissors arrangement, is similar to the multiple separator, but is stronger and can use up to 20 amperes. There are adjustable branches and an oscillating transporter.

The ores treated consist of the economic minerals, calamine, smithsonite, and limonite, with some galena, cerussite, siderite and sphalerite. The gangue is limestone and dolomite, with some barite. The smithsonite and galena are very compact, and, upon crushing, remain largely in the coarse products, while the calamine and cerussite are very friable and break up into fines. The galena carries about 0.2% of silver, but the cerussite contains very little silver.

Ore from the mine cars is dumped to (1).

1. Grizzly having 80-mm. openings between the bars. From the mine; delivers oversize, via hopper, to (2) and undersize, via hopper, to (3).

2. Picking table. From (1); delivers calamine to market, mixed zinc-iron-lead ore to (12), limonite to market and waste rock to dump.

3. Two Ferraris waving screens, each having three screening sections, with holes 14, 20 and 30 mm. in diameter respectively. From (1); deliver material on 30 mm. to (7), material from 30 to 20 mm. to (6), material from 20 to 14 mm. to (6) and material from 14 to 0 mm. to (4).

4. Two Ferraris waving screens, each having three screening sections, with holes 5, 8 and 10 mm. in diameter respectively. From (3); deliver material on 10 mm. to (8), material between 8 and 10 mm. to (6), material from 8 to 5 mm. (8) and material from 5 to 0 mm. to (5).

5. Two Ferraris waving screens with two screening sections, with holes 1.5 and 3 mm. in diameter respectively. From (4); deliver material on 1.5 mm. to (8) and through 1.5 mm. to (9).

6. Twelve 2-compartment jigs. From (3) and (4); deliver mixed lead and zinc ore to (12), calamine to market and tailings to dump.

7. Wire picking belt. From (3); delivers rich calamine to market, ferruginous calamine to market, poor zinc-iron, middlings to (12), limonite to market and waste rock to dump.

8. Sixteen 5-compartment jigs. From (4) and (5); deliver lead-zinc middlings to (12), rich calamine to market, ferruginous calamine to (32), limonite to market, poor iron-zinc middlings to storage and tailings to waste.

9. Hydraulic classifier. From (5); delivers spigots to (10) and overflow to (11).

10. Four 5-compartment jigs. From (9) and (10); deliver cerussite to market, lead middlings to (10), calamine to market, rich iron-zinc middlings to (26),

poor iron-zinc middlings to storage and tailings to waste.

11. Six Ferraris waving tables. From (9); deliver cerussite to market, calamine to market, iron-zinc middlings to (26) and tailings to waste.

#### RECRUSHING DEPARTMENT.

12. Ferraris wet ball mill. From (2), (6), (7) and (8); delivers to (13), crushes through 8 mm.

13. Ferraris waving screen, having three screening sections, with holes 1.5, 3 and 5 mm. in diameter respectively. From (12); delivers material on 1.5 mm. to (14) and material through 1.5 mm. to (16).

14. Three 5-compartment jigs. From (13); deliver middlings to (15), calamine to market, ferruginous calamine to (32), rich iron-zinc middlings to (19), poor iron-zinc middlings to storage and tailings to waste.

15. Four-compartment jig. From (14); delivers lead ore to market, lead-barite middlings to (35), calamine to market, iron-zinc middlings to (26) and tailings to waste.

16. Hydraulic classifier. From (13); delivers spigots to (17) and overflow to (18).

17. Five-compartment jig. From (16) and (17); delivers cerussite to market, lead-zinc middlings to (17), calamine to market, ferruginous calamine to (32), iron-zinc middlings to (26) and tailings to waste.

18. Two Ferraris waving tables. From (16); deliver cerussite to market, calamine to market, iron-zinc middlings to (26) and tailings to waste.

#### AUXILIARY MIDDINGS DEPARTMENT.

19. Ferraris waving screen, having two screening sections, with holes 5 and 8 mm. in diameter respectively. From (14); deliver material on 5 mm. to (20) and material through 5 mm. to (22).

20. Four 5-compartment jigs. From (19) and (24); deliver lead middlings to (21), rich calamine to market; ferruginous calamine to (32), iron-zinc middlings to (26), poor middlings to storage and tailings to waste.

21. Four intermediate jigs run intermittently and discharged by hand skimming. From (20); deliver cerussite to market, lead-barite middlings to (35), calamine to market, poor iron-zinc middlings to (26) and tailings to waste.

22. Four intermediate jigs run intermittently and discharged by hand skimming. From (20); deliver cerussite to market, lead-barite middlings to (35), calamine to market, poor iron-zinc middlings to (26) and tailings to waste.

23. Ferraris waving screen, having two screening sections, with holes 1.5 and 3 mm. in diameter respectively. From (19); delivers material on 1.5 mm. to (20) and material through 1.5 mm. to (23).

24. Hydraulic classifier. From (22); delivers spigots to (24) and overflow to (25).

25. Two 5-compartment jigs. From (23) and (24); deliver cerussite to market, zinc-lead middlings to (24), calamine to market, rich iron-zinc middlings to (26), poor iron-zinc middlings to storage and tailings to waste.

26. Three Ferraris waving tables. From



(23); deliver cerussite to market, calamine to market, iron-zinc middlings to (28) and tailings to waste.

#### MAGNETIC SEPARATION DEPARTMENT.

26. Revolving cylindrical furnace. From (10), (11), (15), (17), (18), (20), (21), (24) and (28); delivers to (27).

27. Ferraris waving screen, having six screening sections, with holes 0.5, 1, 1.5, 2.5, 4.5 and 6 mm. in diameter respectively. From (26); delivers material to (28).

28. Ferraris magnetic separator. From (27); delivers limonite to market, and nonmagnetic tailings coarser than 2 mm. to (29) and finer than 2 mm. to (31).

29. Three intermediate jigs run intermittently and discharged by hand skimming. From (28); deliver limonite to market, calamine to market, middlings to (30) and tailings to waste.

30. Intermediate jig run intermittently and discharged by hand skimming. From (29); delivers calamine to market, middlings to storage and tailings to waste.

31. Three 4-compartment jigs. From (28) and (31); deliver limonite to market, middlings to (31), rich calamine to market, ferruginous calamine to (32) and tailings to waste.

32. Revolving cylindrical furnace. From (8), (14), (17), (20) and (31); delivers to (33).

33. Ferraris waving screen, having seven screening sections, with holes 0.5, 1, 1.5, 2.5, 4.5, 6 and 10 mm. in diameter respectively. From (32); delivers to (34).

34. Ferraris magnetic separator. From (33); delivers calamine to market and limonite to market.

35. Revolving furnace for decrepitating barite. From (15) and (21); delivers to (36).

36. Ferraris waving screen, having six screening sections, with holes 0.5, 1, 1.5, 2.5, 4.5 and 6 mm. in diameter respectively. From (35); delivers material on 6 mm. to market, from 4.5 to 6 mm. to (38), from 4.5 to 1 mm. to market, from 0.5 to 1 mm. to (37) and below 0.5 mm. to market.

37. Three 4-compartment jigs. From (36) and (37); deliver lead ore to market, mixed lead ore to (37), barite to market, calamine to market and tailings to waste.

38. Intermediate jig run intermittently and discharged by hand skimming. From (36) and (38); delivers lead ore to market, lead zinc middlings to (38), calamine to market and tailings to waste.

#### A. I. M. E. Meeting.

The meeting of the American Institute of Mining Engineers which was scheduled for Birmingham, Ala., beginning Oct. 1, will instead be held at Chattanooga, Tenn. This change has been made necessary by the existing peculiar labor troubles in Alabama. It can be said for Chattanooga that it offers many inducements for enjoying a convention such as has been planned by one of our foremost American technical societies. It is also to be expected that the various committees of the Institute which will look after the welfare of the visitors will discharge their duties satisfactorily, judging by precedent.

#### Asphalt in the United States.

BY J. A. TAFF.\*

The long-drawn-out controversy between the United States and Venezuela in which the great Trinidad asphalt concession has figured prominently, has perhaps created the impression that this country is wholly dependent on that famous bitumen lake for its supply of asphalt. It is true that we buy abroad large quantities of this paving material, and that more than half of the imports now come from the island of Trinidad, but our own production greatly exceeds the total imports, and although the increase in our consumption of the material is rapid the growth in the proportion of home production over importations is even more marked.

In 1907 the United States produced 223,000 tons of asphalt, valued at \$2,825,000, against imports of 160,000 tons, valued at \$648,000. Four years ago the total production and importations amounted to but 240,000 tons; in 1907 the total was 383,000 tons, showing an increased use of over 150,000 tons. In 1887 only 4,000 tons were produced, and in 1897 less than 70,000 tons.

Deposits of the various forms of asphalt are found in Kentucky, Oklahoma, Utah, California, Texas, Wyoming, Kansas, Missouri, and West Virginia.

Although asphalt is used chiefly in street paving, it is also applied to many other purposes, such as for waterproofing metals, papers, and fabrics, for preserving wood, in briquetting, and in concrete construction.

The hardest test of asphalt manufacture is said to be in providing pavement for a climate having extreme variations in temperature. If made of a consistency to withstand great heat in summer without melting or becoming so soft as to be useless it is likely to become extremely brittle in freezing weather and to chip and crack. Thus in the Philippines or other tropical climates, where the sun heat may be intense but where the cold need not be considered, asphalt pavement can be made which will stand climatic conditions and endure wear better than in many temperate climates, such, for instance, as that of Washington, D. C.

In connection with paving, or rather "good roads" work, an interesting use is being made of the asphalt residuum of petroleum whose base is asphalt, including most of the oils of the far west. Some of the California and Texas oils, which carry a very large proportion of asphalt—such as 35%—when sprinkled on road surfaces, make ideal "good roads."

In southern California, particularly, thousands of miles of heavy, early roads, over which it was formerly impossible to trot a horse hitched to a light buggy, have been rendered solid and speedy by a single sprinkling of oil, and the houses along the roadside have been freed from the blowing sand and dust which is along natural roads, a great discomfort to the inhabitants of arid or semiarid regions.

The eastern petroleum, which have a paraffin base, cannot be satisfactorily used

for this purpose. The heavy oils of the southwest are less expensive than the best eastern oils, and it may be possible and desirable to use them for the improvement of some eastern roads.

#### Esperanto in Foreign Business.

Now that the auxiliary international language "Esperanto" has passed the experimental stage and its practicability has been demonstrated to such an extent that the United States government has seen fit to recognize it officially in the appointment of Major Paul F. Straub, of the army medical corps, to represent the United States at the Fourth Annual International Esperanto Congress held at Dresden, Germany, last month, it is worth while to give the language consideration from the point of view of its practical utility in business communications between foreign countries.

In America linguists who command more than two or three or the more important modern languages are comparatively rare and are not often to be found in the business world. For that reason many business firms are compelled to send out their foreign letters to some public translator, thereby not only running the risk of errors in translation, but of having their business made known to competitors.

It is common experience that English letters written by foreigners who have only a limited knowledge of the language are often very puzzling and even unintelligible. Would not an international language that is easily acquired and free from strange idioms and words and phrases of double meaning be the means of eliminating many if not all of the present difficulties?

Esperanto fills the requirements mentioned. It is simple, its grammar consisting of sixteen rules that can be learned by anyone of average intelligence in a few hours. Each word has but one meaning and by a system of prefixes and suffixes a large vocabulary is at once available on the learning of a comparatively few word roots.

#### Louisiana Sulphur Deposits.

The sulphur deposits of Louisiana, which furnish the bulk of the domestic production, were discovered about 1868 in a boring put down by the Louisiana Oil Co. for the purpose of developing the oil and gas springs at the head of Bayou Choquie, about 15 miles west of Lake Charles.

At a depth of 443 ft. a deposit of sulphur was encountered, which was proved by other borings a year or two later to be about 100 ft. thick. The beds of water bearing sand overlying the sulphur made the sinking of a shaft practically impossible, and but little attempt to develop the deposits was made until 1895, when a process of obtaining sulphur from these beds was invented by Hernan Frasch, of Cleveland, Ohio.

At the close of 1907 30 sulphur wells were reported in operation.

In seven months this year Great Britain imported 40,286 flasks of quicksilver

\* Extract from Mineral Resources of U. S. for 1907.

# The Effect of Humidity on Explosions in Mines.

By CARL SCHOLZ.\*

Mining Engineer.

During November and December, 1907, four serious mine explosions occurred in the Appalachian coal field, which resulted in the loss of nearly 1,000 lives and caused an enormous damage to property.

Immediately after each accident the respective state authorities ordered close investigations to be made, with the view of establishing the cause and suggesting remedies to prevent recurrence. Representatives of the Technologic branch of the United States Geological Survey, to whom the investigation of mine accidents had recently been delegated by the Secretary of the Interior, visited the mines and co-operated with the local authorities in their determinations. It may be safe to say here that an investigation of a mine after an explosion has occurred discloses but little, because the causes have been removed and conditions have been entirely changed.

On Jan. 8, 1908, the coal operators of West Virginia organized an association at Washington for the purpose of making extensive investigations, and sufficient funds were pledged to carry out this work. At this organization meeting, the representatives of the Geological Survey present had no suggestions to offer as to the cause of these accidents.

An examination of the various reports concerning these accidents indicates that the explosions were caused by the ignition of gas or dust; they show the point of origin and the direction in which the force was expended, and give a detailed description of the damage done. Very little has been said as to what should be done to prevent these explosions, and the object of this paper is to give the result of several years' observation of conditions which I have noticed during 15 years connection with coal mines in various fields of the United States.

The striking features developed by these investigations are:

1. Explosions occur more frequently in the colder months of the year; the colder the winter the more frequent the explosions. If a certain district has extremely cold weather and other sections of the country are comparatively warm, the latter sections are freer from explosions.

2. Mining fields located in higher altitudes are more productive of explosions than those at lower elevations.

3. The hygrometric condition of the atmosphere has the greatest effect upon the cause of explosions.

Every practical mining man knows that the majority of explosions take place between Nov. 1 and Mar. 15. It is well to say here that there are many explosions of a minor character which result in no loss of life, or perhaps one single death only, of which but little is published in the daily or technical press. Every mine examiner instinctively feels danger when he enters the mine on a cold crisp morning.

The fact that altitude and general cli-

*Factors to be considered in coal mine accidents. Federal and state investigations. Effect of climatic and hygrometric changes to explain partly the cause of mine explosions.*

*Spraying with water to prevent accumulation of dust and moisten gaseous mixture in mine.*

matic conditions enter into mine explosions can very readily be verified by an examination of the weather reports showing the general climatic conditions which existed in the various localities when accidents have happened.

The principal fields of mine explosions in the bituminous districts are Pennsylvania, the eastern portion of West Virginia, Alabama, Oklahoma and Colorado; and since coals produced in these fields are high in volatile matter and low in moisture, it is very clear that the chemical composition of the coal has much to do with the generation of mine gases and coal dust.

In examining the records of explosions in West Virginia, it will be noted that most of them occur during unusually cold weather, and but few in the warm season when the trees are in full foliage. In Oklahoma the record indicates that the greatest number of explosions have followed an unusually dry season. It should be noted that this portion of the country is not densely timbered, and contains but limited bodies of flowing water. The same condition applies to Colorado to an even greater extent.

The two conditions above mentioned, when taken in connection with the visible results which they create in the mine by the deposit of excess of moisture during the wet season, or when humidity is high, and the creation of dust during the winter months or the very dry season lead us to believe that the hygrometric conditions of the ventilating currents has much to do with mine explosions; and since this is a matter which can be controlled without much expense, it is believed that the application of a vaporizing system in mines which are dusty and generate fire damp will prove, at least in part, a remedy.

After examining many text books and reports, I noticed that very little reference is made to the hygrometric condition of the atmosphere in connection with mine explosions. The only reference is given by William Tate.<sup>1</sup> Some of the more recent publications refer to the advisability of ascertaining the moisture in the air, but do not state the effect which humidity has, and how the required degree of saturation should be brought about. That humidity in a mine ventilating current is desirable and necessary, is

generally understood, and is emphasized by the recommendation usually made by mine inspectors that roadways be sprinkled with water in order to settle the dust. The adoption of appliances to settle the dust will prove the best safeguard against mine explosions.

One of the most striking remarks on this subject was made by Samuel Dixon before the meeting at Washington, above mentioned. He said that mine explosions began to occur as soon as improved ventilating fans of high efficiency were adopted, and that as long as the mines were ventilated by furnaces and fire baskets, mine explosions were practically an unknown condition. This statement is true in so far as in summer very little water was carried into the mine, and in winter very little was taken out, as is shown by the following statements.

The mines of Oklahoma offer special facilities for the observation of the effects of climate and hygrometric conditions upon explosions, because the coal is high in hydrocarbon and low in moisture; the outside temperature ranges from 90 degs. F. in the summer to 20 degs. F. in the winter, and the hygrometric condition has a wide range, because of the excessive rain in the summer, which is followed by a prolonged dry period in the fall and winter. The observations inside the mines are facilitated by the noticeable effect which humidity has upon the roof during the wet season and the number of explosions which usually occur during the cold, dry season. I therefore selected the mines in this field for a series of observations which were carried on during the past 18 months.

The first purpose of these investigations was to stop the slacking of the roof, which occurs during the "sweaty" season, beginning about May 1 and lasting until the middle of July. During this period a heavy deposit of moisture on the roof causes the slate to slack, especially on the intake airways and near the place of intake. On account of the high cost of timber, this condition considerably increases the production cost. From August to November the mines become very dry, and are dusty for the next three or four months, during which time explosions occur. One fortunate condition in this field is the fact that the veins are pitching, and the water usually runs along the entries, although the beneficial effect of this condition is not generally understood or appreciated.

Observations indicate that when the outside temperature ranges from 75 to 90 degs. F., the inside temperature fluctuates from 72 to 76 degs. F. In the winter, when the outside temperature ranges from 30 to 55 degs. F., the inside temperature ranges from 60 to 64 degs. F. In summer, when the warm air current enters the mine, the temperature falls upon coming in contact with the cold ribs along the entries, and the excess vapor is deposited as sweat on the roof and the roadways, so that no dust exists. The mine, of course, becomes

\*Vice-president Rock Island Coal Mining Co., Chicago. Abstract of paper to be read at Chattanooga, Tenn., meeting Am. Inst. of M. E. in October.

<sup>1</sup>Questions and Answers for American Mine Examinations, p. 27.

drier nearer the upcast, since a part of the humidity is absorbed by the freshly mined coal. In the winter, when the inside temperature is higher than that of the air outside, the cold ventilating current, upon warming and expanding, absorbs all the moisture available. If there is no water available, the relative humidity in the air current is very low. For the purpose of illustrating this more clearly, the following data, representing actual readings, will be of interest:

With an outside temperature of 80 degs. F. and relative humidity of 75%, at a barometric pressure of 29.3 ins., a ventilating current of 75,000 cu. ft. per minute carries into a mine, invisibly suspended in the air, during a period of 24 hours, 15,200 gals. of water. Upon cooling to a temperature of 75 degs. F., not only would the mine current be completely saturated, but there would be deposited in the mine nearly 1,000 gals. of water per day. In the winter, however, with a temperature of 32 degs. F. and a relative humidity of 95%, upon entering the mine and warming to 62 degs. F., the relative humidity of the ventilating current is diminished to 33%, unless an opportunity is given for the air current to absorb more moisture from running water or other sources.

In order to saturate completely this warmed air current of 75,000 cu. ft. per minute, about 9,000 gals. of water per day is required. This is the reason why dust is generated in the winter in the better ventilated mines, as stated by Mr. Dixon, and the assumption is well borne out by the accident at the Monongah mines, which had a ventilating efficiency of the highest order. The more cold air forced through a mine in the winter, the drier will that mine become; the more air forced into a mine in the summer, the more moisture will be deposited along the intake entries, and where the roof is slate, the more difficulty will be experienced in keeping up the top. It is also well known that humidity in the air has an effect upon the ignition of gases, because the fine particles of water invisibly suspended in the atmosphere absorb much of the heat in combustion. For comparison, it may be said that an air current of a temperature of 62 degs. F., fully saturated with moisture, requires approximately 7% more heat units (British thermal units) than dry air to reach a temperature of 1,213 degs. F., which is the point of ignition of fire-damp.

A water spraying system, consisting of a number of small sprays distributed over the first half of the distance which the air current traverses, will have the effect of preventing the formation of dust and moistening the gaseous mixture. The sprays should be placed near the roof, and discharge the water in the direction of the air current. This arrangement will have an additional beneficial effect in mines generating much fire-damp, the descending water spray serving to break up any stratification of gases that may exist in the entries. The proper quantity of water to be vaporized will depend upon altitude, climatic conditions and character of the coal. The only danger to be guarded against is the use of an excessive amount of water, which would result

in cutting a slate roof; if coal or sand rock prevails, no limit need be established, because, with the lower temperature in the mines in this country, the danger which was pointed out by the British Colliery Commission, that excessive humidity injuriously affects the health of the miner, does not exist, the temperature of the English mines being from 90 to 95 degs. F.

A large number of readings taken throughout the various seasons of the year in the Oklahoma mines, indicates that in the summer at the upcast the relative humidity rarely falls below 75%. Theoretically, the air current should be fully saturated; the discrepancy can only be explained by the statement that the freshly mined coal and the dust incident to mining absorb the difference. In winter, the drop in the relative humidity in a dry mine is very striking; and attention is drawn to the fact that in mines where shot-firers are employed, when explosions occur, they usually happen directly after the first few shots are set off, which must be due to the condition that the relative humidity at the point of up-cast is much lower, because what little water was contained in the downcast was absorbed by the workings through which the ventilating current first traveled.

A series of analyses of air were also made, and samples of air were taken in the mine at the end of a day's work, and again from the same point after the mine had been standing idle for 48 hours. The ventilating current was maintained at a uniform rate, and there was no appreciable change in the atmospheric pressure. The first analysis showed that 0.05% of methane existed in the air current next to the floor, which increased to 1.5% near the roof. The explanation of this condition is that the travel trips and men through the mine workings, and the fluctuation of the ventilating pressure, due to the opening and closing of trap-doors, thoroughly mixed the air current and prevented the stratification of the gases.

The second analysis showed no methane near the floor, but 5% near the roof, which indicates that the comparative quiet and smooth travel of the ventilating current during the idle period aided the stratification of the gases. This theory is borne out by readings with a self-recording pressure gage, which showed many violent fluctuations during the day, and produced a practically straight line during the night.

The advantage of a spray, therefore, is that the vapor will break up stratification and mix the gases over the entire cross-section of the entry. This action can be repeated as often as necessary by the spacing of the sprays, and the requirements can easily be determined by hygrometer readings and gas tests. There would be no advantage in or necessity of operating these sprays during the summer, unless indicated by hygrometer readings in very dry mines. The sprays used in conducting these experiments, and now used in several of the mines under my management, are manufactured by Paul Lechler, Stuttgart, Germany; but there are several manufacturers in the United States who produce similar apparatus which can be adapted to suit the condi-

tions, as, for instance, the American Moistening Co. of Boston.

The principal benefit derived from sprinkling water by means of water boxes or hose lines, as now generally practiced and recommended, is that moisture is provided for absorption by the dry mine air. As far as the settling of dust is concerned, unless the sprinkling is very thorough and often repeated, the results are not satisfactory, because a deposit of coal dust is impervious to water unless thoroughly mixed with it; a thin moist coat will form on the surface, beneath which the dust is as dry as ever.

The cost of labor in this method of sprinkling is very high and the service performed is spasmodic, and unless constantly looked after by foremen or superintendents it is likely to be neglected.

The advantage of a spraying system is that, in addition to preventing the formation of dust, the sprays can be utilized to prevent stratification of gases at night or on idle days, and this advantage can be obtained at a cost of installation but little greater than that of the hose system, as it involves only the addition of spray boxes at a cost of \$2 each. There is no expense connected with this, because most mines employ pumps on idle days and at nights, and the shaft pressure can be used in the sprays; or if this is not convenient, in most places some outside supply can be connected which will insure continuous operation.

It is believed that the operation of such a spraying system, by reason of the continuous and automatic protection which it furnishes to the mines, is the most economical, and at the same time the most important step which coal operators can take to safeguard their mines.

I recommend that mining engineers and coal operators, in fields subject to gas explosions, obtain, for their own information, a record for a year, taken once a week, both outside and at the point of upcast, to show the temperature and relative humidity, and from these results compute the amount of water which is carried into and taken out of the mine.

Gas rises more rapidly in an atmosphere free from humidity, as is demonstrated by the ascent of chimney smoke on a cold crisp morning; and conversely, the opposite condition prevails in foggy weather. Likewise do gases rise to the roof of the mine and accumulate there in dry atmosphere; if the air is moist the ascent will be much slower.

Another comparison between the conditions in a mine and dry and wet weather may be made by the operation of internal combustion engines. The consumption of gasoline in the summer is much greater than in the winter in the same climate; in the warm weather the excess of humidity present in the mixture absorbs a certain amount of heat-units before the vapor develops effective power; consequently an automobile consumes more fuel in the summer than it does in the winter under the same conditions. A gaseous mixture containing dry air becomes explosive with a much smaller percentage of methane, and the higher the ratio of humidity in the mine and the ventilating current the less is the danger.

# An Improved System for Ventilation of Mines.

By W. E. ELLIOT and J. G. WILSON.

The systems of mine ventilation now in use or proposed include not only those by which one continuous current of air is maintained throughout the main drives and leads, but also those piping systems either extending along the drives or tapping the drives or individual galleries from a pipe lying on the surface of the ground. The proposed piping systems for primary ventilation are impractical for two main reasons.

First, as is well known, the minimum amount of fresh air required for men working underground is 100 cu. ft. per minute for each man and for horses and mules, from three to six times that amount each. The limited capacity of pipes whose size would not interfere with the working of the mine makes it impossible for sufficient air to be supplied by that means in mines employing a large number of men.

Second, although where the mine is tapped in a number of places and the main lies wholly on the surface of the ground, the main may be of any size, yet the great cost of sinking the shafts, especially where the main drive lies hundreds of feet below the surface, prohibits the use of this system. The other system—namely, directing currents of air throughout the various drives, leads and galleries, has been found to supply sufficient air for breathing purposes under normal conditions but not, however, sufficient means for carrying explosive gases and mixtures out of the mines.

The present invention, patented in the United States (No. 888,073, May 19, 1908), therefore contemplates an auxiliary system of ventilation for accomplishing the latter result. The main ventilating system may be of any preferred type as the installation of our auxiliary system in any mine will not interfere with the working or efficiency therin in use.

The gas which is most generally dreaded in mines is  $CH_4$ , commonly known as fire-damp. While it is true that this forms the main constituent of the gases causing mine explosions, yet special precautions need not be taken as to it, since its presence in sufficient volume to cause, *per se*, an explosion may be readily detected.

The general concurrence of all mining authorities now is that coal dust, rather than fire-damp, plays the most important part in colliery explosions.  $CH_4$ , by itself must be present to an extent of at least 5% to be explosive, while 11 to 12% give the most violent explosive gas. However, as has been conclusively proven, as small an amount as 1% of this gas mixed with coal dust and air form an explosive mixture, while 3% of it mixed with coal dust and air gives a mixture of tremendous explosive power.

This coal dust, which is present to a great extent in all collieries, clinging to notches, floor, sides and ceiling, is practically unaffected by the main air current. Even laborious brushing and dampening is but a temporary expedient, and the

*Faults of various systems for primary ventilation. By the new auxiliary method explosive gases and mixtures are carried out of the mines.*

*The arrangement of the new system makes possible the flooding of the mine in case of fire.*

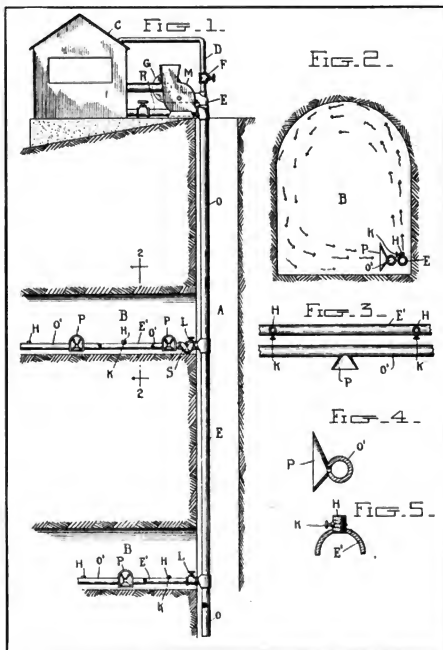
many recent disasters have proven the necessity of carrying it completely out of the mine.

To accomplish this purpose we provide a system of two parallel pipes which ex-

tend throughout all the drives, leads and galleries of the mine. In the main drives the pipes are of much greater diameter than those branching off therefrom, and valves or dampers are provided by which the branch pipes extending into any drive may be cut off from the mains.

These parallel pipes lie upon the flooring of the drives and to one side of the tracking, the pipe nearer the wall being the air supply pipe and the other the exhaust pipe. The former is provided with threaded nipples, directed toward the roof of the drive and at right angles to the direction of the pipe. To the exhaust pipes are secured, at the same distance apart as the nipples, funnels, which funnels, however, are placed midway between the air inlets.

The funnels are flat bottomed and are



Plans Showing Construction and Operation of New Ventilating System.

attached to the exhaust pipe on the side nearer the center of the drive. The apex of the funnel surrounds a smooth bore tap in the exhaust pipe. It will thus be seen that we have provided means for directing auxiliary currents of air in a course at substantially right angles to the main air current. We therefore obtain a continual mixing of these currents and the air is kept in a continually agitated condition, so that, as the air is drawn into the exhaust pipe the coal dust is sucked in with it and carried from the mine. Of course, the outer part of the auxiliary current is unmixed with the main current and continues around the sides of the drive, sweeping the coal dust into the currents and causing its ultimate expulsion from the mine.

By placing the parallel pipes on the flooring of the drives, they provide certain and efficient means for ventilating any part of the mine that may be cut off by a cave-in and also to carry away the poisonous carbon monoxide and other gases that result from explosions and that causes, so often, the death of imprisoned miners.

A further object is to provide means for flooding any part of a mine with water or steam in case of fire, by cutting off the air compressor, and by closing the proper nipples and main valves and connecting the inlet pipe to a water or steam supply, to direct such streams to the seat of the fire, thus obviating the necessity of an extra system of water pipes.

In the accompanying drawings wherein is illustrated one of the various possible embodiments of our invention, Fig. 1 represents a sectional view of the workings of a mine showing our invention applied thereto, the exhaust pipe being broken away in part for the sake of clearness. Fig. 2 is a cross sectional view, on a larger scale, taken on line 2-2 of Fig. 1, and looking in the direction of the arrows. Fig. 3 is a perspective view of the pipes, showing the alternate arrangement of the inlet nipples and exhaust funnels. Fig. 4 is a cross-section through a funnel and the exhaust pipe, and Fig. 5 is a cross-sectional view of the inlet pipe on a larger scale, showing a threaded and valved nipple thereon.

Referring to the various figures in which like reference characters designate like parts, A represents the main shaft of a mine and B the drives leading therefrom. C is the boiler and engine house and D, a steam pipe leading from the boiler to the air inlet main E, said steam pipe being provided with a valve F which is normally closed. G is an air compressor, which may be of any approved type, and by means of which a constant supply of air under pressure is afforded the air inlet main E and pipes E'. H, I are the threaded nipples on the air inlet pipes and K, K the valves with which each nipple is provided, the nipples being threaded to afford means for hose connection in case of a small fire, while the valves allow all the nipples not wanted open in such an exigency to be closed. L, L are valves on the air inlet pipes by means of which the pipes in any drive may be closed. Similar valves or dampers are provided for the pipes in each gal-

lery or chamber. M is an air exhaust fan which may be of the Guibal, Waddle, Schiele, Cappell or any preferred type. O is the exhaust main and O' the exhaust pipes, the latter being provided with smooth bore taps at regular intervals, over each of which is a funnel P.

The funnels are the same distance apart as the air inlet nipples and it will be noted that the funnels are placed midway between the nipples so as to alternate with them. This arrangement is of the highest importance in that no fresh air is taken in by the exhauster until it has made a more or less complete circuit of the drive.

By having the nipples pointed upward and the funnels facing the drive side opposite to that against which the pipes are laid, the current of air is forced to pass up one side, across the roof, down the other side and return across the bottom of the drive to the exhaust funnels. In case a "blower" of C.H. is struck, a hose having a funnel at one end and a fitting of rubber or similar substance in the form of a truncated cone at the other end, would be utilized. By inserting the fitting in the smooth bore part of the exhaust pipe and holding the other end of the hose up to the blower, the escaping gas would be quickly carried from the mine.

During the circulation of our auxiliary air current the particles of coal dust are being constantly drawn into the exhaust pipes and the powerful suction will carry them to the surface where they may be carried by pipes into vats of water and from the resulting liquor various products may be obtained. Or, if preferred traps S, which may be of any preferred construction, may be provided at certain interval in the exhaust pipe, in which the coal dust will be collected and then removed.

While we have described one method of carrying out our invention it should be understood that various changes may be made without departing from the spirit of our invention, which contemplates, broadly, the creating of currents of air transverse of the drives in a mine.

### Canadian Mining Institute.

If our advice prove to be prophetic then the summer excursion of the Canadian Mining Institute, which began Aug. 24 and will terminate Oct. 1, can be said to be a unique success. The trips to points of interest to mining men and others as arranged by Secretary Lamb have paved the way for similar excursions by other technical societies. The visit to the famous silver district of Cobalt alone is worth all that it has cost the members and their friends to travel from afar. What will be seen in British Columbia and elsewhere must also equitably compensate the ardent friends of the Institute. The task of the committees in charge of the parties taking the different excursions is of a kind that has greater value than can be expressed in guineas and pence, or dollars and cents; it is the hearty appreciation of those who have been entertained that will recompense the gentlemen on the respective committees for their zealous work.

### Pigment From Coal Mine Sulphur.

BY JOSEPH C. HECKMAN.

The object of my invention, patented in the United States May 5, 1908, is to provide a pigment of high color and brilliancy made from a waste product heretofore accounted as of no commercial value.

The waste product which I employ is obtained from coal mines and is most commonly known as "coal mine sulphur." This product is discharged by the water which drains from the mines, and finds its way usually to the neighboring creeks and streams.

I collect this product by constructing a reservoir or dam in the stream where the water is held, so as to give the product an opportunity to precipitate and fall to the bottom. This precipitate, in the form of a fine powder, is then collected from the bottom of the reservoir. It may be obtained by other methods, such as by collecting the water from the mines, in shallow pans or basins and allowing the water to evaporate, leaving the fine dust or impalpable powder.

This is a yellow substance and when analyzed is found to contain silica, iron oxide and sulphuric acid combined with iron, and with slight traces of lime and magnesia. This product may be subjected to the action of heat in the form in which it is recovered and when calcined produces a good pigment, but by treating the product with the addition of sulphuric acid and then calcining the same I obtain a pigment very rich in iron oxide and of a brilliant red color, which when mixed with suitable oils, turpentine, etc., gives a paint of high color and great tinting capacity.

In manufacturing my improved pigment I may introduce into a suitable vat or reservoir one part of the coal mine sulphur, from one-fifth of one part to one part sulphuric acid and one-fifth to one part water by weight, and after thoroughly mixing the same the mixture is allowed to stand to give the sulphuric acid time to thoroughly act on the iron and thus convert it into compounds which through subsequent stages of the process—calcination—are readily converted into red oxide of iron.

After the mixture has stood for 12 to 26 hours, it will be in the form of a semi-fluid or pasty mass, which I then introduce into a suitable muffle, or reverberatory furnace. Heat is then applied and the mass is calcined and reduced to a pulverulent form.

Where I produce the pigment from the coal mine sulphur without the addition of the sulphuric acid, the coal mine sulphur is introduced in its dry state into a suitable furnace, where it is calcined. While I am able to obtain a very good pigment by calcining the coal mine sulphur in its original state, yet, as stated above, by the addition of the sulphuric acid I obtain a more brilliant color and a paint of greater tinting capacity. The pigment so produced may then be mixed with suitable oils, turpentine, etc., adapted for iron or wood work, and may also be employed as a coloring for many other lines of manufacture.

# The Copper Deposits of Lake Osoyoos, Wash.

By HORACE F. EVANS,

Explorer and Geologist.

Economic geology must keep pace with actual mining. The effort to furnish reasonable explanations with regard to the remarkable occurrence of metallic ores within the earth's crust has become more intense than ever, especially with regard to copper, than it has been with any of the other metals, for the mining and metallurgy of this metal has set the pace for the geologist as well as the miner.

The production of copper in the United States has more than once defied the laws of political economy, because its production once, at least, has been of a character which cannot be carried on without loss and disaster. Nevertheless, the increasing production of copper is as certain as the tides, and when the demand for it is based on legitimate consumption there is no danger for over-production.

When Baerman, geologist to the British section of the International Boundary Commission in 1860-1861, found carbon-

*Early finding of copper on shore of Lake Osoyoos. Geological features of the deposits and surrounding country.*

*Extensive occurrences of copper and iron ores await development with the building of the railway. Prospecting with the diamond drill.*

miners who were doing the assessment work struck copper sulphide of a high grade. It was found to occur in a calc-spar vein from 2 to 4 ins. in width, intersecting a calcareous sandstone and in the rock close to where the carbonate showings are. The occurrence of sulphide ores in this neighborhood is a pronounced feature in connection with these ore deposits.

Having made extended investigations into the geology of the Osoyoos area following Baerman, especially into the conditions under which the copper deposits on the west side of the lake occur, recent explorations show that the occurrence evidently belongs to that class of deposition known as "contemporaneous with the enclosing sediments" which the older school of geologists always regarded as being rare.

It is these classes of deposits that have of late years been discovered and exploited as a result of the great demand for copper caused by a period of phenomenal activity and growth.

Of the copper deposits contemporaneous with the deposition of the sediments that I have lately examined three may be mentioned.

(1) Those in the Sierra mountains, N. M., which occur in Permian shales and sandstones. These formations extend for a number of miles. There are, at least, three distinct copper bearing sandstones disseminated in minute grains. There are no dikes or igneous rocks in this field. The ore consists chiefly of chalcocite. Carbonates are in evidence, and go down a few feet. The ores do not occupy lines of faulting and, therefore, they antedate the faulting of the district. The ore often replaces plant remains, and from this it has been inferred that the copper was deposited from the waters which are responsible for the enclosing sediments.

In Josephine county, Oregon, there is a similar deposit in calcareous sediments. The grains are diffused through the rock mass. The beds continue for a number of miles. There is very strong iron capping and great oxidation. There has been great erosion of the uplifted beds. These beds are now at an elevation of from 2,000 to 3,200 ft. above sea level.

There are evidences of two zones of secondary sulphide enrichment at different horizons. The beds are intruded upon to some extent by rocks of an in-

tricate complex, which form a mineral belt intersecting the sediments obliquely, a little east of north and south of west.

These peridotite rocks have already attracted the attention of United States geologists. The rocks are known to carry nickel, platinum, chrome iron, and asbestos.

Among the local prospectors the rocks in which the copper deposits occur were known as diorites, porphyries and calc-spar. The decomposition of the minute grains of copper pyrites throughout the calcareous sediments produced the carbonates of various shades of green and blue.

The first prospector who appears to have recognized the unusual character of these deposits was Noel B. Kelsey, a native of St. Lawrence county, New York. Mr. Kelsey possessed some knowledge of prospecting, acquired in Nevada and California, and being guided by the carbon-



Michigan Cut.



The Alhambra Cut.

ates of copper on the face of rocks close to Copper Lake and near the crossing of the International boundary on the west shore of Lake Osoyoos, his first step was to see if there was any quartz ledge in the neighborhood. That was 47 years ago, and it was a perfectly natural conclusion then, though the discoveries of late years and the rapidly increasing literature on the "genesis of ore deposits" that the mining press is affording, suggests that copper like gold is "where you find it."

In his notes, on the occurrence of these carbonate ores, Baerman says: "On the west side of Lake Osoyoos a bed of sandstone is found which is stained bright green for a short distance. This is produced by carbonates of copper resulting from the decomposition of a minute quantity of copper pyrites scattered through the rocks."

No definite copper lode could be found in the immediate neighborhood. The claims on which these carbonates occur adjoin what was formerly known as the Kelsey group, recently acquired by the Oroville and Oroville Exploration Co.

Last winter while assessment work was in progress on the claims nearest to Copper Lake and where there is a great showing of green and blue carbonates, the

ates, he made a number of locations until finally these locations became a group of 15 claims.

In a close and quiet way Mr. Kelsey associated himself with people of means and influence in Detroit, and for a number of years development was limited to the assessment work and to prospecting and exploration.

The geology of the Osoyoos Lake area has been, to a limited extent, investigated by a number of official geologists, British and American. Baerman made some investigations in 1860 to 1861. Dawson in the '70s made a hurried reconnaissance through the Similkameen, and based the correlations of the international strata on lithologic grounds. Dr. George Otis Smith, the present director of the United States Geological Survey, made a hurried reconnaissance in this vicinity in 1901, and one or two unofficial geologists have made some explorations into the structural geology of the neighborhood during the past two or three years.

In the hills lying between the Similkameen river and Osoyoos Lake in the Okanogan valley black siliceous slates occur lying in a trough of contortion on beds of gneissic mica slate. These beds occupy the high ground in the center of the

hills, and on the west shore of Lake Osyoos a coarse granular conglomerate occurs, having a dip of 70 degs. in a direction east 25 degs. south. These have been sharply folded on the divide between the two rivers—the Similkameen and the Okanogan.

According to United States Geological Survey investigations the oldest rocks of the Okanogan valley at the international boundary are the slates which naturally occupy the lower position of the sedimentaries. The sedimentary rocks have been correlated with the Cache Creek rocks of British Columbia, which are of carboniferous age.

The correlations are not exact, having been made on lithologic grounds. These rocks in the localities where the greatest assemblage has been noted comprise both sedimentary and volcanic material. The lower portions consist principally of clay slates and graywacke slates (the latter composed of the detritus of feldspar). These are usually of gray or greenish color. Some moderately coarse and fine conglomerates occur.

The upper part of the series comprises much volcanic material which has not yet been separated in the field by geologists. The old volcanics have their greatest de-

velopment at the southern end of Palmer mountain and they have been officially classified as greenstones.

The sedimentary rocks of the Osyoos basin which have been previously correlated as Carboniferous have undergone considerable alteration. These have been found in general to possess an indurated slaty character in the localities somewhat removed from granitic intrusions. The greatest mass of batholith occur on the east side of the lake and east and southwest of the town of Oroville.

The mass to the northeast has undoubtedly had the effect of making the sedimentary rocks of the Kelsey field harder, but the greatest influence has evidently been exercised by the interbedded andesites. These at one time must have spread over a greater area than they now occupy. The present hornblende andesite cap that occupies a prominent position southwest of the Kelsey group though exceptionally resistant has suffered from subaerial erosion, and there are evidences that it once occupied a much greater area over the supposedly Carboniferous sediment than it now occupies.

Briefly, then, the copper deposits on the west shore of Lake Osyoos may be described as occurring in calcareous slaty sediments, resting on indurated clay slates which are the oldest rocks, the age of which are tentatively placed as Carboniferous.

Further south, towards Oroville, the slates and granular rocks are overlain by sandstones which are supposed to be of Eocene-Tertiary age. That the Carboniferous rocks are overlain by rocks of Permian age near Oroville seems to be evident in some cases, but inasmuch as Permian rocks are included in the Carboniferous by the United States Geological Survey this distinction does not make much difference, though it is believed by unofficial geologists that the sandstones which overlie the slates and granular rocks are of Tertiary age.

Investigations into the geology of that area will from time to time be carried on officially and otherwise, and the geologic story of Osyoos Lake, which is of supreme interest to geologists, will be unraveled and written.

The map herewith, prepared by the authority of the United States Geological Survey, shows the structural geology of the Osyoos basin, with reference to the underlying and oldest rocks, which are the slates of Okanogan valley.

The stratigraphy and the genesis and relations of the intrusives and extrusives have yet to be ascertained. The advance along the enlightened lines of science necessarily keeps pace with the construction of railways and the settlement of the country.

Let it be taken for granted that iron and copper ores, even native copper, occur on a grand scale diffused through rock masses and forming vast zones.

The present generation of mining men has no instinct after small quantities of ore. It makes for big deposits, mountains of ore, suggesting steam shovel and a tonnage that easily enters into the scale of hundreds of millions.

The copper deposits of Lake Osyoos were in June of the present year prospected with a diamond drill in order to determine the continuation downwards of the slaty limestone and the continuity of the mineral character.

Six diamond drill bores were put down on as many different claims, the entire group containing 15 claims. The bores represented lengths of 100 ft. vertical, 67 ft. vertical, 110 ft. incline, 120 ft. vertical, 100 ft. incline, and 103 ft. slant.

The type of drill used was the Sullivan "Beauty." Steam power was employed. Water was supplied by means of barrels, the water being obtained from a lake and two wells. The contractor was O. L. Knight of Rosland, B. C., with two assistants. The time occupied was from May 30 to June 23, inclusive.

The cores saved on the whole were about 70%. Some of the core pieces were well preserved. One piece was about 13 ins. long, and many averaged 5 ins. One core took place owing to fractured and shelly ground. The rocks bored were limestone lenses resting on slates, one of which was arenaceous (the Denver) where there was good coring. On three of the claims there were slaty limestones. The true slates which are known to carry

copper on the west side of the lake were not reached by the drill.

The diamond drill used in June on the Kelsey group, owned by the Detroit & Oroville Exploration Co., of Michigan, bored a perfectly small hole to the full depth. It was adapted to any angle and any direction, and brought to the surface many solid sections of cores 1 1/2 in. in diameter.

This drilling was a means to an end. The occurrence of copper pyrites in crystals diffused through Paleozoic altered limestones had to be tested to ascertain the conditions relating to the continuity of the sediments downwards and the constancy or inconstancy of the mineral character.

The owners of the property were determined in advance to know something definite in relation to the real character of the copper bearing sediments at a depth of at least 100 ft. and in this way form a basis for future prospecting with the drill.

The net result of the drilling was to find that the composition and mineral character of the calcareous and slaty sediments were the same at the lowest



Ore House On Kelsey Group.



Sullivan Beauty At Denver Cut.

points reached as at the surface. Thus the conditions were constant throughout. Concentration in a small way was found on calcite veinlets and on small fractures, suggesting concentration on a larger scale farther down.

No quartz veins carrying copper were intersected by the drill. Copper carbonates disappeared at a depth of 30 ft. The oxidized zone was not passed through in the lowest bore hole, and the inference is that as the zone of secondary sulphide enrichment always occurs below the oxidized zone, the sulphide enrichment zone may be anywhere from 100 to 250 ft. below the zone of oxidation. Osyoos Lake is 930 ft. above sea level and the probabilities are that the zone of ground waters or primary ores is not less than 1,000 ft. below the present surface of Osyoos Lake.

The area of the Kelsey field is about 300 acres, containing zones of sediments averaging 1,000 ft. long by 2,000 ft. broad with an actual depth of 100 ft. (theoretical depth 475 ft.) of copper bearing sediments with an average assay not yet fully determined.



# Gold Mining and Milling Practice in Tasmania.

By RALPH STOKES.



RALPH STOKES.

daily 5,000,000 gals. is the daily average.

The mine was taken over by a new company in 1903, and has lately been in a state of mechanical transition and re-equipment, on account of the demands for higher efficiency—some necessitated by deeper and more vigorous exploitation, others prompted by defects characterizing pre-existent plant and systems. With Messrs. John Taylor & Sons (who technically control the Kolar gold fields) as managers and consulting engineers and William Frecheville as director and adviser, the new control is certainly not lacking in administrative strength and talent.

Unfortunately, however, the financial position is not one that gives the management an entirely free hand and the many peculiar difficulties to be contended with force a policy of great cautiousness. It is easy to find fault with many features of the company's property (which represents an old amalgamation of leases) as it stands today, but criticisms would be superfluous. Things had to be taken as they were and faults are being rectified as occasion allows. It is only to be regretted that after the serious and costly flood, which proved a most unlucky setback at a time of good progress, there should have been a development at the 1,100 level of a somewhat disappointing character—that is, comparatively disappointing, for the company's notion of a "poor" development would not coincide with that accepted upon the majority of gold fields.

The mine stands alone, supporting the well situated little township of Beaconsfield. The few other concerns in the district are practically of no importance to-day. Geographically the mine is thoroughly well favored; geologically it is both blessed and cursed—blessed by its fissure lode of exceptional richness, width and good breaking qualities; cursed by its enormous influx of waters through the limestone and sandstone strata constituting the country rocks of the ore body.

In terming the lode a "true fissure vein" one gives that much abused term a strictly accurate application. It runs northeast and southwest and dips to the southeast at an angle of 60 to 70 degs., while the country strata (sandstones, grits, conglomerates and limestones) strike northwest and southeast and dip

*Geology and development of the gold deposit. No machine drills used, because rock is easily broken by pick. Pumping plant has capacity of 8,000,000 gals. per day.*

*Labor conditions and cost of production. Lührig vanners, Edwards' roasting furnaces. Roots' blower.*

northeast at a somewhat flatter angle. Thus the gold carrier runs across the beds almost at right angles. The detailed assay plans show that the gold is fairly regularly distributed, the patches of higher and lower values occurring without any particular zonal relation. On the other hand, the country rocks generally have a decided influence on the gold values of the lode, which tend to follow down the sandstones in their dip to the

of the mine, which was farthest to the east. Mr. Twelvrees points out that behind the limestone, conformable with it and underlying it, the level passed through a bed of dense tenacious clay, 33 ft. thick. This is known as the "dye." Westward it merges into a zone of what can be best described by the term "broken country" or "broken formation."

The reef in this section "becomes irregular splitting and jumping up and down. The reef tails out just where the broken formation begins; its track goes into it for a little way and then disappears."

Of the level above the 600 ft., the end does not go far enough east to reach the clay "dye." Mr. Twelvrees, whose primary object in writing his report was to define the prospects of the property adjoining the Tasmania, concluded:

"Looking at the indications, I am rather disposed to connect the rock shattering with the actual formation of the reef, that is to say, that both occurred at the same time. All reefs must have a termination



Tasmania Gold Mine and Beaconsfield Township.

northeast and to be reduced where the fissure cuts into the limestone on one side and a series of conglomerates and sandstones (near more limestone beds) on the other. Mr. Frecheville referred to this feature in some of his notes as follows: "The dark and light sandstone beds have proved in the past to be favorable to the occurrence of gold and the conclusion is justified that they may be expected to do so in the future in depth. In other words, the inclination or pitch of the shoot of ore, has followed the intersection of the lode with these particular sandstone beds."

The influence of the country rocks or the true significance of the alteration in the lode toward the limestones was well discussed in a report by Mr. Montgomery some years ago and in 1903 by the present government geologist, Mr. Twelvrees. It is a matter of great economic importance.

Discussing conditions on the 700 level

somewhere or other, and I conceive it highly probable that this broken ground formed the end of the fissure and received only the final uncertain tricklings, so to speak, of the silica solutions which, in the more defined channel to the west, crystallized as the famous reef."

The length of the channel is 1,400 to 1,500 ft.. The ore being generally of an easy breaking character, no machine drills are employed. Pick work can be extensively practiced in the stopes. Formerly flat stopes were carried from winze to winze, but now a system of drilling is being used with advantageous results. Levels are cut 100 ft. apart. Development is not far advanced.

The company possesses three large shafts—the old main shaft, Hart's and the new incomplete Grubb shaft, 32 ft. 1 in. by 8 ft. in the clear.

The pumping plant is of three units, two of which are in the new shaft and one in the Hart's, each with a horizontal



compound condensing pumping engine, with 50-in. high pressure and 108-in. low pressure cylinders, operating a double set of 20-in. plunger pumps, capable of raising about 8,000,000 gals. per day, or 2,000,000 gals. each unit at 6.9 10-ft. strokes per minute. To 500 ft. the rods are 32 ins., from 500 to 1,000 ft. 18 ins., subsequently being decreased to 16 ins., for 1,000 to 1,500 ft., and 14 ins. for 1,500 to 2,000 ft. The average capacity of the three units is 5,000,000 gals. per day.

The chambers which have to be cut in the shaft are enormous. Thus, at 500 ft. in the Grubb shaft, the chamber measures: 120 by 14 ft. and 25 ft. deep. The total chamber capacity of the shaft will be equivalent to 450 ft. of ordinary sinking, 32 by 8 ft.

Careful examinations of local stratigraphy and water courses have been made to determine whether anything could be done to check the enormous influx of water into the mine. Despite the universal reputation of limestone beds, in which caverns and channels are so easily formed, as the conveyors of water, it is probable, in the case of the Tasmania mine, that they are little or no worse than the sandstones and conglomerates.

A few months ago the mine was visited by a terrible flood, which did enormous damage and cost the company, directly and indirectly, many thousands of pounds sterling. A torrent of water poured down a neighboring creek, causing a great collapse of ground into the caverns of the limestone beds (into which the mine workings cut) and the consequent inrush of many hundred million gallons of water into the beds "feeding" the mine.

The management has determined that the possible recurrence of a similarly phenomenal flood will not be attended by such serious trouble to the company, and a big fluming scheme, costing \$75,000, has been built on very thorough lines, so that even the heaviest flood may be carried over the cavernous area, now marked by extensive subdivisions, without contributing to any extent to the mine's influx. Water has always been a very weighty factor in the Tasmania's progress and with the deepening workings must always remain so. At the time when the new company took over the property from the old, the lack of working profits was primarily due to the expense of pumping and the inadequate capacity of the plant.

The "grade" of the company's reduction plant is scarcely in keeping with that of the ore treated. In many respects the battery and auxiliary works are inefficient, but faults are not attributable to the present control, which remedies defects whenever the capital expenditure appears to be justified and investigates problems with scientific thoroughness, without the benefit of such guidance as is always obtainable on fields of several propositions, and striving for the same object on different lines.

The mill comprises two sections, one new of 40 stamps (1,000 lbs.) and an old section of 63 light stamps, which the manager, Mr. Heathcote, hopes to replace in the future by 60 heavy stamps. The average duty of the mill as at present constituted is very low. But even with the heavy stamps, large duties are not

aimed at. Thus for a recent period, the average stamp duty for the whole mill was 2.55 tons per day; the new battery doing 3.35 tons and the old no more than 1.7 tons per stamp.

The ore is a milky quartz, with some pyrites (commonly associated with good gold values). A quantity of sandstone is mixed up in stoping with the lode product, upon which sorting may prove advisable when the mill is working at full capacity.

In the newer mill the 1,000-lb. stamps are given 87 8-in. drops per minute (1, 5, 2, 4, 3 order). There are front and back inside plates. The screening used is 12 punched holes per linear inch for the new mill and 14 for the old. The screen product then flows over tables and canvas strakes, into a hydraulic classifier and spitzkasten, separating out 10 distinct products. Nos. 1 and 2, reckoning from the coarsest, are delivered by small wooden chauters to jigs producing concentrates for the chlorination plant and tailings for cyanide treatment. Nos. 3 and 4 go to Wilfley tables, producing concentrates for chlorination, a middle product with much siderite (returned) and tailings. Nos. 15 to 10 inclusive are fed to six Lahrig vanners, from which are obtained concentrates, middlings for a lower set of six vanners and tails. The secondary Lahrigs yield concentrates and tails. It is found that the concentrates won by jigs, tables and vanners average 8% of the mill product.

The tailings, elevated outside the mill by a 40-ft. wheel, pass through a spitzkasten, separating out the slimes, which are allowed to run to waste. Their average value is 2.7 dwts.—rich enough, one would think, to be worth conservation. The sands, averaging 2.5 dwts., are treated in cyanide vats for a 55% extraction.

The concentrates, averaging 1.5 ozs., are roasted in four Edwards' furnaces, 63 by 7 ft., eliminating all save a trace of the sulphides. After cooling, they are treated in chlorinating vats of which there are 36. The tailings from this plant, which average 4 dwts., are being reserved for future treatment, together with some of the richer slimes. Tests have shown that an extraction of 75% is to be anticipated by the cyanidation of the chlorination tailings. The cyanide plant is under the direction of Mr. Macartney.

The present total extraction claimed is only 85%, though this must certainly be raised where alterations and additions to plant can be made.

Under present conditions, the average tonnage milled per month—water difficulties not being too obstructive—is rather over 5,000 tons, or 65,000 tons per annum for 42,000 ozs. fine gold, or \$13 per ton. Working costs are high—perhaps higher than might be expected, certainly higher than they will be upon the completion of new construction work. Expenditures during 1906 were unfavorably affected by the flood already mentioned, but prior to that calamity they had been reduced upon the previous year's figures. For the 12 months ended September 30, 1905, which must be referred back to for a long run (though on a smaller crushing basis than the present), working costs totaled \$8.90 per ton, of which

pumping accounted for \$1.40 per ton crushed. Mining cost \$7.70 per ton, ventilation, 22 cents, milling 80 cents, concentration 25 cents, chlorination 50 cents, crushing and tramming of ore, 25 cents, surface costs 42 cents, repairs to buildings, machinery, etc., 42 cents per ton crushed. The item ventilation is a substantial one owing to the frequent penetrating of carbonic acid gas into the workings, some of which can only with great difficulty be cleared. The limestone beds are, indeed, particularly unfortunate neighbors, with their unsolicited contributions of water and gas. With the aid of a Rook's blower and a thorough piping system to tap the most ill-reputed sections, the gas evil is vigorously combated, but it can never be dispelled.

Turning to labor conditions, it may be noted that contracts are freely let in development and stoping. Long contracts are favored by the management. Current wages and earnings are: Miners, \$1.80 on day's pay, average \$2.15 on contract; truckers, \$1.45 on pay and \$1.70 to \$1.90 on contract; engine drivers, \$1.90 to \$2; laborers, \$1.70; boys, learners, 85 cents; mechanics, \$2.15 to \$2.40; smiths, tool sharpeners, \$1.70 to \$1.95; millhands, \$1 and upwards; stokers, \$1.45 to \$1.90; timbermen, pitmen, \$2 per shift of eight hours. Contracts are let by the stoper, by the foot in development (\$9 per ft. is a fair price for a 9 by 5 crosscut, contractors filling their own trucks), and by the 100 trucks, for six months, in trucking. As at Mt. Lyell and Mt. Bischoff, trades unionism is weak compared with that established at Kalgoorlie and Broken Hill. The company also enjoys a certain advantage in that Beaconsfield is a one mine district, with a large number of mining families whose homes have been long established along its pleasant straggling highway.

### Water Used in Stamp Milling.

In stamp mill practice at the Homestake gold mine in the Black Hills of South Dakota, crushing with a 10-in. height of discharge, some 10 or 12 tons of water per ton of ore are required with the ordinary method of supplying water, for creating sufficient agitation to wash out the particles of ore. At the Simmer East on the Rand, when fine crushing in the battery with the same height of discharge (10 ins.), the operators employ the ordinary water ratios (say, 7 to 1), because the gently rising current of water introduced near the die level serves to carry upwards by a process of elutriation, particles fine enough to pass the screen.

The importance of a not excessive water ratio, says Mr. Caldecott of the Simmer East mill, becomes evident when it is considered that upon the volume of pulp depends the plate area, cost of elevating pulp, number of classifiers, launder and collecting vat capacity, and cost of pumping water back to the mill.

Last year asbestos to the quantity of 10,281 short tons was produced in the Urals in Russia. This is the high record.

# Rock Drill Bits; Their Proper Shape and Work.

By D. J. O'ROURKE.\*

Much attention is paid to the mechanical details of drilling machines at the time of their purchase, to secure those which will be most efficient in the amount of power used and in cost for maintenance. Too often this is as far as the user's interest goes. Having procured a good drill, he does not take steps to secure the very best working efficiency from it.

The question of drill steel, its selection, care and use, is one which is given far too little attention, and which in many cases is the determining factor as to the economic success of a drilling plant. If the steels are of good materials, carefully made, sharpened and tempered for the work to be done, and if fresh steels are put into use, as soon as the steel begins to wear, the drills will come up to expectations as to speed and efficiency; but if the blacksmith is incompetent and the drill runner careless, the management could better afford to throw out its machines and go back to hand drilling.

## THE BLACKSMITH.

The blacksmith's work should be recognized as almost equal in importance to that of the master mechanic at a drilling plant. The best smith is none too good, even if there should not be enough work to justify the wages he may demand.

It is cheaper to have a blacksmith and helper idle once in a while than to have two or three drill runners and their helpers standing around watching the drills wearing themselves to pieces, and perhaps helping them along with a sledge hammer, while the drills fail to give results, merely because the bits are not right. There are also other men on the premises shoveling away dollars in the shape of coal, and this too must be taken into account. When it is all summed up, the idle time of the blacksmith and helper is an insignificant item.

When a new compressor plant is installed, every feature, whereby a pound of coal or an extra foot of air may be saved or made is investigated, and every precaution taken to secure economical results. After the plant is running, the drilling, which was at all times the main object, is sometimes allowed to run along in such a way that anywhere from 10 to 50% of the power developed is completely lost.

No one would think of allowing a hoisting engine to raise a load with the brakes partially set, but something similar occurs when a rock drill bit is run so long that it is the same age for 1 in. or more back of its cutting edge, or is allowed to be made with shoulders on it in the first place.

## SHAPE OF THE BIT.

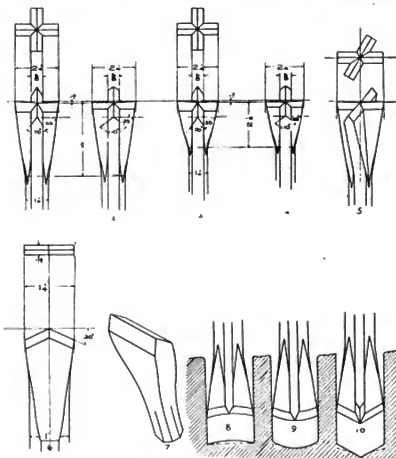
For drilling rock of any kind, the cross-bit, made like Figs. 1, 2, 3, and 4, sometimes modified to the X shape shown in Fig. 5, is usually employed. It will be observed that the bits above referred to are made concave with the corners of the

*Suggestions as to the running and care of rock drills. Why drills have different shapes. Faults of certain drills.*

*The cross-bit is more economical than the flat bit. In soft rock dull bits should be used. Method of sharpening drills.*

wings ahead of the center. This design is recommended because used bits show very little wear at the center as compared with their outer edges. This indicates that the corners do the largest part of the work. The cutting done by them so weakens the rock toward the center of

The cross shape of the center, together with the increased amount of work which falls upon it, in this case, greatly retards its cutting efficiency. Fig. 10, the diamond pointed bit, also divides the fracture line, but at the same time increases its length, leaving less cutting for the center. With this bit, the rock tends to break to a flatter angle than the angle of the bit, allowing the center to go in advance of the corners for a few blows, when the entire bit again comes in contact with the rock, fracture again takes place, and the progress described above is repeated. This bit is recommended only for marble, soft limestone, and other even, soft rocks. Its advantage for this work lies in the fact that nearly all drilling in quarries is done on laid out lines, so that this form enables the holes to be started accurately. The bit, however, is made



Shapes of Rock Drill Bits.

the hole that it does not afford so much resistance to the center of the bit.

Figs. 8, 9, and 10 show what actually takes place in fracturing the rock with bits of several shapes. Fig. 8 shows the concave bit, whose corners cut ahead of the center, making the line of breakage very weak and leaving little resistance for the center of the bit, as described above.

Fig. 9 illustrates a convex bit. In this, the center has to cut ahead of the corners. The fracture line is thus divided, leaving but little work for the corners to do.

very thin and is not strong enough to be satisfactory on general mining and contract work.

The flat, or "bull" bit, as it is sometimes called, shown by Fig. 7, is made in various shapes, but no matter how it is made its use is very severe on a rock drill. If thin, it has no remaining qualities; if made heavy, as it generally is, the blow delivered imparts a severe jar to the machine.

The flat bit, with diamond point, Fig. 6, is a style which has been used in marble

\*From Mine and Quarry, June, 1908.

quarries from the earliest introduction of the rock drill. The steam pressure used in those days was considerably lower than now, so that this bit was satisfactory, and cut slow enough to ream the holes fairly well. Even under these conditions it was hard on the rotating device, but when higher pressures were introduced its cutting capacity was increased, while its reaming qualities remained the same. The flat bit may be cut more rapidly for a short time, but in the long run the cross will be found more economical.

The use of the X bit, Fig. 5, is not general, but sometimes is desirable when a cross-bit will persist in drilling "rifled" or 5-fluted holes on rock of some kinds. Sometimes rifling is charged to the machine, but the fact that the X bit is not required on all kinds of rock rather disproves this imputation.

Figs. 1 and 2 are bits for hard, non-gritty rock, and are alike except for the different angles shown on the cutting edges. Fig. 1 shows about the highest angle to which the cutting edge can be made without danger of breaking. The angle shown on the cutting edge in Fig. 2 is one of many which may be used under different conditions, without any other change in the bit.

In cutting hard and medium hard rock, sharp drills and a wide-open throttle may be used to good advantage, and the hole will not ordinarily clog with mud, as the amount of rock loosened by each blow is so little that it is at once mixed into slush by the water in the hole. The sharp rebound of the drill when striking hard rock, together with the positive recovery of the machine, quickly gets rid of this slush.

If the same bits and drill are run on an open throttle in soft or even medium soft ground, the hole soon becomes clogged. The reason for this is that while the hole remains of the same diameter, and the amount of water for mudding purposes is therefore the same, the steel chips cut three or four times as much dust at each blow as it does in hard rock. The rate of cutting should therefore be reduced in order to keep the drill working at maximum efficiency.

The speed may be regulated by throttling the air or steam, but this reduces the rapidity of action of the drill, so that it does not always mix into slush the dust caused at even the slower speed. The recoil of the steel from soft rock is also considerably less. In soft rock duller bits should be used, like that shown in Fig. 4. The angle of the cutting edge may be even higher than this, sometimes almost square on the end, in order to secure good results.

#### LENGTH OF UP-SET.

In connection with the above subject it is well to bear in mind the length of the wings or ribs for different kinds of work. Figs. 1 and 2 show an extreme length for very hard rock, intended to give strength and hold the gage as long as it is necessary.

Figs. 3 and 4 show shorter ribs which give the bit more clearance and make it more desirable for general purposes. Under ordinary conditions its ability to mix

mud is much greater than that of the long bit, like Fig. 1. This shortness gives greater flare to the wings, causing a greater backward thrust to be given the cuttings whether wet or dry. In rock which wears the gage rapidly, however, the up-set should be longer.

For drilling dry holes in tunnel headings or elsewhere the bit with short ribs has less tendency to allow the hole to draw up. The friction of this style of bit retards the machine but little, and will cause it to cut down towards the lower side of the hole, thereby straightening it. If this is done in time, it saves frequent drops of the arm and keeps the hole where it is wanted. It will be found on experiment that such results cannot be gotten if a long bit with very slight clearance is used. The wings are  $\frac{3}{8}$  in. thick for the size shown in Figs. 1 to 4, and should never be less than that for this size of bit and steel. They should be the same thickness throughout to allow free return of the cuttings. If gage less than  $2\frac{1}{2}$  ins. is desired, make the bit correspondingly shorter.

#### SHARPENING THE BITS.

It should be especially noted that in all the sketches the outer edges of the wings are square. This feature is very important, to preserve the gage of the hole. Whether the bits are sharpened by machine or by hand, care should be taken that no bits are made with the outside edges made rounding like a figure 8. The question of maintaining the gage of the hole throughout its length is very important.

It should be carefully determined just how much work each drill bit will do before the gage begins to wear. In the hardest rocks a bit is never in condition to use the second time, and from 24 to 30 ins., depending on the length of the feed, is all that is ever attempted. Sufficient steel is therefore supplied, so that a sharp set is on hand for each hole.

In softer rock and ore it frequently happens that the steel will not become dull even if used on several holes. Drill runners are, therefore, apt to disregard the question of the gage so long as the cutting edge is sharp. The gage, however, causes the rub in more than one sense. This is where the rub comes in that retards the work of the drills, shortens their life, consumes power, and increases the repair bill.

For example, on this kind of rock a runner is given two sets of sharp steel to drill a required depth. Each set will drill perhaps two holes each without making trouble. About the third hole on which this steel is used the bits stick and there is a constant demand for a hammer or a chuk wrench with which to beat the steel, and if the right point of humor is reached there is no discrimination shown between the steel and drill piston.

Here is a drill that worked all right for the first hole, fairly well on the second, and will not work at all on the third. The rock is the same and the drill is the same, but not so the bits. The only sharp bit that can be gotten into that hole must be made specially in the blacksmith shop half a mile away, so the hammering is kept up and the drill finally worked down

somehow, taking usually more time than it took to put in the first two.

When the gage wears so that a new steel is needed in order to insure its following the last, an entirely new set should be used. It makes no difference if one of the bits still appears good, for it is economical not to waste time with it. On any rock on which the cutting edges are not dulled upon the first hole, a system should be devised by the foreman or superintendent to determine how much each bit will do without too much "hammer help." The improvement will be very pronounced. The runner or blacksmith should have nothing to say as to this system.

The blacksmith should have rigid instructions to furnish all bits to the exact gage required, so that the new bits will work freely when placed in the hole. Much time is wasted from the fact that bits are not made exactly to gage to begin with.

Users of mechanical drill sharpeners are advised to give thought and care to securing the proper dies and dollies to make hits suitable to the conditions under which they are to be used; also that when drills are being dollied the dies do not open. Some rather impossible looking bits are occasionally seen for this reason alone.

The matter of tempering bits is another point in which the blacksmith can save or waste much drilling time to his employers. A competent blacksmith will furnish bits of the precise temper, to suit the rock being drilled.

#### Mine Accidents in Oklahoma.

The fatality record for Oklahoma for 1907, as reported by William Cameron, formerly the Territorial mine inspector, shows that there were 89 coal mine accidents during the year, a decrease of three from 1906; 33 men were killed and 56 injured in 1907, against 44 men killed and 48 injured in 1906.

Of the 33 fatal accidents six were due to gas and dust explosions, 11 to powder explosions and misplaced shots, 11 to falls of roof or coal, and five to other causes. The death rate per 1,000 employees was 3.9, and 110,383 tons of coal were mined for each life lost.

The number of men employed in the coal mines in 1907 was 8,998, who worked an average of 216 days, compared with 8,251 men for an average of 166 days in 1906. The total time lost in 1906 was equivalent to 40% of the total time made; the total time lost in 1907 was equivalent to a little less than 1% of the total time made.

The average production per man in 1907 was 434 tons, as against 346.6 tons in 1906 and 379.2 tons in 1905. The average daily production per man was 2.01 tons in 1907, against 2.09 tons in 1906 and 2.02 tons in 1905. Practically all the mines of the state are operated on the basis of an 8-hour day.

Spain imported 625,473 tons of coal in the four months ending with April, this year, which compares with 698,449 tons for the same period in 1907.

# Is There Another Butte District in Montana?

By HORACE J. STEVENS.

Ten years ago the Butte copper district in Montana, was believed to be but little more than a mile square. Gradually the limits of paying copper ground have been extended. Franklin Farrel, more than 10 years ago, backed with cash the hypothesis that good ore would be found east of the recognized limits of the copper belt, and the mine that he started, now the Pittsburg & Montana, is a regular producer, small, to be sure.

The North Butte is so recent that its spectacular success is almost of the present day. The able men at the head of this enterprise secured the old Speculator mine, having a deep shaft and known to be rich, but of small area. The Gem and Jessie were added, these having several ore bodies of value, of which one ranks among the best ever opened, and later the Berlin and other claims were secured. The exact area of North Butte remains a secret, but it has grown since the company was organized, and probably will continue to grow, as good claims become available at fair prices.

No copper mine ever opened leased into place among the great producers of the globe so suddenly as North Butte, and its success in making a mine of the first magnitude in a district known to carry rich ore, but generally thought of small extent, had much to do with enlarging the accepted field of profitable ore extraction in the Butte camp.

As a result of the gradual expansion of the known boundaries of pay ore in Butte, the boom period, beginning in 1906 and ending in the spring of 1907, saw nearly four score new mining companies organized, these including a number whose closest connection with Butte was found in their titles.

Of this great number of new companies, many were organized to sell stock, while others were promoted with the best of intentions, but with lamentable lack of judgment. A few were well supplied with money, but the majority were born in poverty, and a large number ended by starving to death. Of the total number about a dozen remain in fairly good circumstances, and several are developing good ore bodies.

The zone of oxidation in Butte is very deep, and the weaker companies died before they penetrated to the level where paying ore might be looked for. The net result, however, will be the adding of several good mines to the camp and the extension of the proven limits of profitable ore occurrences.

The big mines of Butte hill were fortunate in that the outcrops of the ore bodies came to surface, and were plainly discernible for the guidance of the explorer, even though these were leached of commercial copper values, as a rule, and it remained for the silver mines to be the pioneers that led to the opening of the incomparably greater mines of copper.

To the east and west the solid ledge rock is overlain by heavy wash and those who search for mines under this must subsist on faith while spending money in large sums, merely to get down to a

*Good ore found east of the recognized limits of copper belt, initiating extensive development. Influence of the North Butte on mining and organization of numerous corporations.*

*Geological features of the older sections of Butte as compared with the new. The Buxton district, and its prospects.*

depth where it is possible that ore may exist in paying quantities.

The possibilities of an extension of the Butte district have excited speculation almost since the Anaconda was first opened, now nearly 30 years. Jefferson county has been held by some to carry the eastern extension of the Butte formation, but while promising mines are being opened near Corbin, Boulder, Clancey, Wickes and other towns in Jefferson county, these must stand upon their own bottoms, their identity with the typical Butte formation being founded upon weak grounds. Within the past few weeks much interest has been aroused in the Buxton district, this taking its name from a modest railroad siding known as Buxton station.

The Buxton district lies about ten miles southwest of Butte, and the good showing made by the original company, the Butte & Buxton Copper Mining Co., has led to the plastering of the ground with mining locations for several miles, some of the claims so located being of promise, while others are of the sort that shade out from the center of every big new find, and of which the less said the better.

At present the only serious mining work in the Buxton district is found on the property of the pioneer company, which itself is no patriarch, having been incorporated only April last, though considerable development was done before the company was organized.

The Butte & Buxton tract is of about 250 acres area, with an axis of northeast and southwest, following the trend of the vein system, as shown by outcrops, surface trenching and underground development. The principal point of interest lies, not in the good ore secured, which is a matter affecting the owners mainly, but in the marked similarity that the Buxton district bears to the Butte camp, and the possibility that it will become a great copper field.

While too early to predict the future with safety, the features of similarity already noted between the Buxton and Butte camps are sufficiently numerous and striking to render the new field intensely interesting to Butte men, and, as before noted, have led to the plastering of some square miles of hills with a great number of mineral claims, running in all directions, according to the cheerful western style, where one man's guess is as good as another's, and where every

locator, except a few early ones, who actually have ore, runs hypothetical veins in whatever direction his fancy may lead, and lays down his side lines accordingly.

The feature first noted by all visitors to Buxton is the typical Butte granite. The identity of this granite with that of Butte is admitted by all engineers and mining men who have visited the new camp, but while this is a good foundation, more than one granite is needed, and other things as well, to make another Butte. The Butte granite, at Butte, has been intruded by the Bluebird granite, and evidences of this latter granite have been noted at Buxton, but the point has not been fully determined.

That there is a later granitic intrusive at Buxton, as at Butte, seems reasonably assured, and the determination of this later granite as the Bluebird, or not, will be awaited with interest.

To the north of the Butte granite on the Butte & Buxton group is an eruptive dike of porphyritic diorite corresponding somewhat to the rhyolitic quartz-porphry at Butte, known locally as the Modoc porphyry. There also are faults crossing the veins transversely, as at Butte. There are several ore bodies running approximately northeast and southwest, with laterals branching therefrom.

Only one ore body has been opened to any considerable depth, though numerous trenches and shallow pits show the veins to be continuous, carrying occasional lumps of carbonate ore, but being below commercial grade.

The surface of the district is covered with a shallow wash, running only 1 to 4 ft. in thickness, but sufficient to have hidden the ores for 30 years, though within 10 miles of the greatest copper camp on earth.

The Buxton district was discovered, not by a geologist or trained engineer, but by a plain miner, Peter Lacker, whose knowledge of rocks was of the practical sort, learned by hammer-and-drill work in the copper mines of Lake Superior and Montana.

The Butte & Buxton mine is opened by tunnel, but this gives a back of only 130 ft., and a 1,000-ft. shaft is projected. At the depth of 130 ft. the ore body opened shows a 10 to 12-ft. paystreak, carrying high copper and lead values, with about 25 ozs. silver per ton. The vein is 60 to 100 ft. wide, the balance carrying mainly argentiferous calcopryite of low grade, with occasional carbonate stains, and a highly silicious gangue. It is entirely probable that the paystreak will show chalcocite at greater depth, and the concentrating ore should improve in copper tenor.

It is to be hoped that the 1,000-ft. shaft of the Butte & Buxton will be pushed with all speed, as it is only by deep sinking that the mineral values of the district, so promising at surface, can be fully proven.

British Guiana exported 1,908 4-16 carats of diamonds, valued at \$13,338, from Jan. 1 to July 22, this year.

# Manganese Ores: Occurrence, Uses and Value—I.

By E. C. HARDER.\*

The manganese mining industry in the United States is at present, as for several years past, very small. In 1907 less than 20 mines were in operation, and not half that number operated steadily. Of the large districts of the United States, namely, the Valley and the Piedmont districts of Virginia, Cartersville and Cave Springs of Georgia, and Batesville of Arkansas, only the first two produced manganese ore in 1907.

For this lack of activity there are three reasons:—(1) the discontinuous and scattered nature of the deposits, (2) the crude mining methods naturally resulting therefrom, and (3) the low prices paid, which prevent attractive profits to operators under these conditions.

All of the ore mined has to be either washed or sorted, and often both. Single pockets as a rule are small and are soon exhausted, so that the erection of expensive concentrating plants is discouraged, except in cases like the Crimora basin in Virginia, which is not at all typical of known American manganese deposits.

In short, under present conditions domestic manganese cannot compete with the foreign high-grade product. The larger part of the ore mined in this country is used in the brick, paint and chemical industries, about one-sixth (847 long tons, valued at \$6,747 in 1907) being used in the steel industry, as against the 209,032 long tons imported for this purpose. The main reason for this seems to be that, although the demand in the former industries is limited, the prices paid are higher and ores can be used which would be undesirable in steel manufacture. Besides, the mining is on such a small scale that the supply does not run far ahead of the demand in these industries.

## USES.

The uses of manganese in the industries may be classified as follows: (1) Metallurgical, in the manufacture of alloys and in copper and silver reduction; (2) chemical, as an oxidizer and as a coloring material.

The manganese ores used in the manufacture of alloys are dependent in value on the percentage of metallic manganese present and on the absence of injurious substances like phosphorus and sulphur. The latter condition is especially true in the case of the alloys with iron. Spiegeleisen and ferromanganese are alloys of iron and manganese. The former contains below 20% manganese, while the latter has a manganese content ranging from 20% to 90%, above which the alloy becomes unstable. Silicon and carbon are present in varying quantities.

Spiegeleisen and ferromanganese are used in the manufacture of steel in the following ways: (a) as reducers of iron oxide in the final melting, in which case the manganese oxide formed goes into the slag; (b) as recarburizers of steel,

*American production insufficient to meet demand, making necessary imports from India, Cuba, Brazil and other countries. World's production.*

*Record output of manganese alloys in 1907. Prices of ore are governed by the schedule of the Carnegie Steel Co.*

in which case they contain considerable carbon; (c) for counteracting the effects of phosphorus and sulphur by the formation of manganese compounds with these elements; (d) in the manufacture of manganese steel, used for railroad and street car rails on curves, for burglar-proof safes, for car wheels, and for other purposes. The addition of small quantities of manganese gives to steel hardness, ductility and strength.

Manganese is also used to form alloys with copper, zinc, aluminum, tin, lead, magnesium, and silicon, and with combinations of these metals.

Manganese oxides are used to a slight extent in copper and silver reduction as a substitute for iron oxides.

As an oxidizer manganese oxide in the manufacture of chlorine, bromine and oxygen, and of disinfectants like potassium permanganate; as a drier in paints and varnishes; as a decolorizer of glass, and in the Leclanche battery. In these cases the value of the ore depends on its available oxygen content—that is, on its percentage of pyrolusite or manganese peroxide.

As a coloring material, manganese is used in calico dyeing; for coloring bricks, glass, and pottery, and in the manufacture of green and violet paints.

Compounds of manganese are used in a small way for medicine, and the mineral rhodonite, a silicate of manganese, is used rarely for ornamental purposes on account of its beautiful pink color.

## PRICES.

The prices of manganese ores used in the steel industry vary from \$5 to \$15 per long ton, according to the grade of the ore. They are governed by the following schedule of prices established by the Carnegie Steel Co.:

Schedule of prices paid per ton of 2,240 lbs. for domestic manganese ore delivered at Pittsburgh or Bessemer, Pa., and South Chicago, Ill.

Prices are based on ores containing

not more than 8% silica or 0.25% phosphorus, and are subject to deductions as follows: For each 1% in excess of 8% silica there shall be deduction of 15 cents per ton; fractions in proportion.

For each 0.02%, or fraction thereof, in excess of 0.25% phosphorus there shall be a deduction of 2 cents per unit of manganese per ton.

Metall. Manganese in Ore.	Price per Unit.	
	Manganese. Cents.	Iron. Cents.
Over 49% .....	30	6
46 to 49 .....	29	6
43 to 46 .....	28	6
40 to 43 .....	27	6

Ores containing less than 40% manganese or more than 12% silica or 0.27% phosphorus are subject to acceptance or refusal at the buyer's option.

Settlements are based on analysis of sample dried at 212 degs. F., the percentage of moisture in the sample as taken being deducted from the weight.

The manganese ores for oxidizing and coloring purposes are valued according to the quantity of manganese peroxide present, their consistency, etc., and prices range up to \$25 per ton for the better grades of ore.

## PRODUCTION.

The production of manganese in the United States in 1907, amounting to 5,604 long tons, exceeded that of any year since 1902 except 1904. Toward the close of 1902 there occurred a sudden drop in production due to the cessation of mining operations in northwestern Georgia, after which there was a steady increase from the 2,825 tons produced in 1903 to 6,921 tons in 1906.

The bulk of the production was, as usual, in Virginia. South Carolina joined the ranks of producers for the first time since 1903, and produced more ore than in any previous year. Tennessee also showed an increase and a fair promise of becoming something more than a mere intermittent producer. California produced more ore than in any year since 1902. On the other hand, Georgia and Arkansas, which contain some of the most important manganese deposits in the country, were not on the list of producers of manganese in 1907, although Arkansas produced considerable manganeseiferous iron ore. The Utah mines, which gave fair promise for several years, were again idle.

The following table shows the quantity, the value, and the average price per ton of the manganese ore produced in the different States in 1906 and 1907:

State.	—1906—			—1907—		
	Quantity, long tons.	Value.	Average price per ton.	Quantity, long tons.	Value.	Average price per ton.
Arkansas .....	62	\$ 250	\$1.68	100	\$ 690	\$ 6.90
California .....	1	29	29.00	—	—	—
Georgia .....	—	—	—	—	4,809	12.22
South Carolina .....	—	—	—	800	1,500	1.88
Tennessee .....	30	390	13.00	—	—	—
Utah .....	800	10,000	12.50	—	—	—
Virginia .....	6,028	77,522	12.86	4,604	56,469	12.27
Total .....	6,921	\$88,132	\$12.73	5,604	\$62,569	\$11.31

\* Extract from Mineral Resources of U. S. for 1907.

# Shop Talks, No. 1—Jas. McCrea & Co., Chicago

By GEORGE E. EDWARDS.

A leaky steam pipe, with the consequent loss of steam energy and waste of time in unsatisfactory repairs, to be eventually followed by a shutdown in replacing the damaged pipes; a study by a progressive engineer of how best to overcome these not only serious but annoying troubles, led to the manufacture of an appliance that has resulted in the building up of a prosperous business in Chicago.

M. B. Skinner, who had been engaged

world devoted exclusively to steam pipe repairs.

The instant success of the Climax clamp was very encouraging to the manufacturers and a demand soon arose for other appliances of a similar nature, which was met by the introduction of the Emergency pipe clamp, designed to stop leaks from splits and rust holes. The Model

ual street very soon became too small to keep up with the growth of the business and quarters were secured at 67 West Washington street, where double the space of the original quarters were available and where such additional machinery was installed as, in the opinion of the firm, would meet all requirements for years to come.

The popularity of the company's product, and the steadily increasing new business, however, convinced them otherwise, and it was found necessary to secure larger space and install additional machinery in order that prompt shipments might be made.

These quarters, at 63 and 65 West



Portion of Machine Shop, James McCrea & Co.

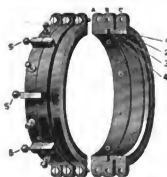
for a number of years in the steam specialty business and who was thoroughly conversant with its exacting demands saw the great need of an emergency repair for leaky steam pipes and flanges, with James McCrea incorporated the firm of James McCrea & Co. and purchased a

flange clamp for repairing leaks between flanges quickly followed and that both met with prompt approval was evidenced by the large number of orders received.

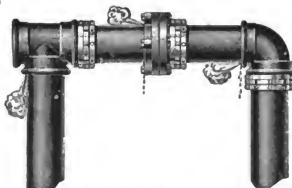
As business grew other specialties were introduced, including the H. H. steam

Washington street, possession of which was taken May 1 of the present year, gives the firm sufficient space and up-to-date equipment with which to properly care for all the demands of its customers.

The Climax steam joint clamp is a practical device for repairing leaks at pipe joints. It is made of brass and in sizes of from one-half inch to 30 ins. and should the piping be changed the clamp can be removed and used again. By its



Climax Steam Joint Clamp.



Showing Application of Climax Clamp.



Model Flange Clamp.

small machine shop at 11-13 South Canal street.

The Climax steam joint clamp was the first appliance manufactured by the company and with this as a nucleus the business of the firm has been built up to such an extent that it is to-day generally recognized as being the largest in the

trap, the Butman jointed flue rod, the Wernicke boiler tube cutter, the Century gasket cutter and Century drilling machine. In the electrical line the firm manufactures the Robert's boring machine for electric wiring and the Zeck boring machine.

The little shop at 11 and 13 South Ca-

construction the packing is forced by the same means as that applied to a gland in a stuffing box—directly to the leak—and so contained it does not crowd up between the face of the fitting and the clamp. It is in general use by steam users all over the country and is applicable wherever steam pipe is used. It

is also largely used for repairing ammonia and water pipes. When it is taken into consideration that the worst possible leak may be repaired permanently in a few moments, and that too without shutting off the pressure, it is not to be wondered at that the appliance meets with such a ready sale.

The Emergency pipe clamp is made of malleable iron in halves and is designed



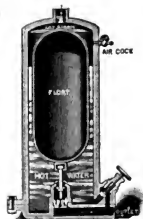
Emergency Pipe Clamp (4 1/2 to 12 ins.)



Emergency Pipe Clamp (1/2 to 4 ins.)

for repairing splits and rust holes in pipes. One side of the clamp is hinged and the other side bolted. By placing a piece of packing over the leak this repair is clamped on in a few moments with only the use of a small wrench, making a very quick and economical repair. The Emergency clamp was first made in sizes of from one-half inch to 4 ins., but a demand for larger sizes arising, it is now made up to and including 12 ins.

The Model flange clamp is designed to



H. M. Steam Trap.

stop leaks between flanges. It is not intended as a permanent repair, but will successfully do its work until such time as the plant is shut down and flanges repacked, when the clamp is taken off and laid away for future troubles.

The H. M. steam trap has few working parts. The valve is connected directly with the float by means of a swivel, doing away with all levers and toggle joints. As the float is always about two thirds of its height in water, it gives, the manufacturers claim, the longest water seal of any trap manufactured. These traps are sold with a guarantee that if they do not give perfect satisfaction the company will pay the freight both ways.

## Mineral Paints in United States.

BY ERNEST F. BURCHARD.\*

The total production of mineral paints in the United States in 1907 amounted to 143,757 short tons, valued at \$9,469,818, and was greater by 3,044 short tons in quantity and \$1,308,982 in value than the production in 1906.

The mineral paints that enter into this production are comprised in two classes:

1. Natural mineral products which, after mechanical treatment, such as cleaning and grinding, are either used directly as pigments or are first roasted to give desired colors. This class includes ochre, umber, sienna, hematite, and limonite (metallic paints and mortar colors), slate, and shale. The total production of pigments of this class in 1907 was 48,516 short tons, valued at \$539,436. In quantity of domestic output the products of this class rank as follows: Ochre, with a production of 16,971 short tons, valued at \$164,742; metallic paint, 16,225 short tons, valued at \$195,176; mortar colors, 10,490 short tons, valued at \$110,719; shale and slate ground for pigments, 4,130 short tons, valued at \$40,540; umber and sienna, 739 short tons, valued at \$19,309. The statistics of other mineral or mineral products used in the paint trade, such as asbestos, asphalt, barytes, clay, gypsum, magnesite, silica, talc, and whiting (ground chalk), are separately collected and reported.

2. Chemical products made directly from ores. This class comprises zinc oxide, leaded zinc oxide, zinc lead, sublimed white lead, and sublimed blue lead, and its total output in 1907 was 97,211 short tons, valued at \$8,939,332. The production of zinc oxide, the most important of the zinc pigments, was 71,784 short tons, valued at \$6,490,660; that of zinc lead was 13,516 short tons, valued at \$1,286,440; the output of sublimed white lead was 8,700 short tons, valued at \$1,026,600; and that of sublimed blue lead was 1,211 short tons, valued at \$135,632.

A third class of mineral paints comprises secondary chemical products, basic carbonate white lead, litharge, red lead, orange mineral, lithophone, and Venetian red. The collection of the statistics of production of these pigments does not, strictly speaking, come within the scope of the Survey's work, but as the figures are desired for purposes of comparison by many mineral-paint producers, they are included in the report. The production of corroded white lead reported to the Survey in 1907 was 92,216 short tons in oil, valued at \$12,138,932, and 35,035 short tons dry, valued at \$4,309,392. These figures represent a slight decrease, both in quantity and value, from the production reported in 1906. Litharge was produced to the quantity of 20,838 short tons, valued at \$2,854,987, and this output was greater than the combined production of litharge and orange mineral in 1906. The production of red lead in 1907 was 20,078 short tons, valued at \$2,802,454, an increase in quantity of nearly 7,000 short tons over the production in 1906. The production of lithophone in 1907 was more than double that in 1906, amounting

to 10,275 tons, valued at \$750,350. There appears to have been a decrease in the production of Venetian red from 13,526 tons, valued at \$198,394, in 1906, to 7,566 short tons, valued at \$134,167, in 1907, but the value per ton has apparently increased about \$3.07.

## American Tools in France.

The American tools found in service in the Creusot Steel Works in France include the following:

Brown & Sharpe, Providence, R. I., vertical millers; Pratt & Whitney, Hartford, Conn., lathes; Norton Grinding Co., Worcester, Mass., grinders; Fosdick Machine Tools Co., Cincinnati, Ohio, boring machines; Niles Tool Works, Hamilton, Ohio, planers and drills; W. F. & J. Barnes Co., Rockford, Ill., drills; Hendy Machine Co., Torrington, Conn., shapers; Defiance Machine Works, Defiance, Ohio, planers; Gisholt Machine Co., Madison, Wis., five turret lathes; Potter & Johnson, Pawtucket, R. I., automatic turret turning and chucking machines to the number of about 20; National-Acme Manufacturing Co., Cleveland, Ohio, threaders.

At the works of De Dion-Boutin & Co. in Paris the American tools include:

Bullard Machine Tool Co., Bridgeport, Conn., boring mills; Prentice Bros., Worcester, Mass., drills; Gisholt Machine Co., Madison, Wis., turret lathes; Potter & Johnson Machine Co., Pawtucket, R. I., automatic turret-turning and chucking machines; H. G. Fish Machine Tool Co., Worcester, Mass., lathes; Harbutt-Rogers Machine Co., South Sunbury, Mass., cutting-off machines; Pratt & Whitney, Hartford, Conn., automatic turret lathes and cutting off machines; Brown & Sharpe, Providence, R. I., millers and grinders; Landis Tool Co., Waynesboro, Pa., grinders; Fitchburg Machine Works, Fitchburg, Mass., lathes; the Hendy Machine Co., Torrington, Conn., planers; Mark Flather Planer Co., Nashua, N. H., shapers; the Waltham Watch Tool Co., Springfield, Mass., plain milling machine; Kempsmith Machine Tool Co., Milwauke, Wis., millers; Warner & Swasey, Cleveland, Ohio, hexagonal turret lathes; W. F. & J. Barnes Co., Rockford, Ill., drills; R. F. Barnes Co., Rockford, Ill., drills; Cincinnati Machine Tool Co., Cincinnati, Ohio, drills; Aurora Tool Works, Aurora, Ind., upright drills; Watson-Stillman Co., New York, steam hammer; National-Acme Manufacturing Co., Cleveland, Ohio, multiple spindle automatic screw machines; Foote-Burr Co., Cleveland, Ohio, reliance bolt cutters and nut tappers; Bickford Drill and Tool Co., Cincinnati, Ohio, drills; Gleason Works, Rochester, N. Y., gear cutters; Hartford Machine Screw Co., Hartford, Conn., screw machines; Draper Machine Tool Co., Worcester, Mass., lathes; Davis & Egan Co., Cincinnati, Ohio, boring mill.

Some of the richest placers are those formed by the erosion of older placers and the reconcentration of their gold.

Geologists estimate that Seward Peninsula, in Alaska, carries a total of 650,496,000 cu. yds. of gold bearing gravels.

\*Extract from Mineral Resources of U. S. for 1907.

## Coal Mining in Washington.

BY E. W. PARKER.\*

Although a good part of the market for Washington coal in California has been lost through the increased production of fuel oil in that state, Washington shared in the general increase in the production of coal in 1907. The total output for the year was 3,680,532 short tons, having a spot value of \$7,679,801, an increase of 401,348 tons, or 12.54% in quantity, and of \$1,771,367, or 29.98% in value, compared with 1906. The average price per ton advanced from \$1.80 in 1906 to \$2.09 in 1907.

During the first 10 months of the year the coal mining industry of the state was in a highly satisfactory condition. In November and December, however, owing to the financial disturbances, the output of the mines was curtailed about 33%. But for this the production would probably have exceeded 4,000,000 tons.

The number of men employed in the mines increased from 4,329 in 1906 to 5,945 in 1907, and the average number of working days increased from 266 to 273. The average yearly output per man declined from 723.4 tons in 1906 to 619 tons in 1907. The average daily production per man decreased from 2.72 to 2.27 tons.

Nearly all the mines are operated on an 8-hour schedule, 5,594 men out of a total of 5,945 employed working eight hours a day in 1907.

Washing apparatus has been installed at 15 plants and the total amount of coal washed during 1907 was 799,015 tons, yielding 644,501 tons of cleaned coal and 154,514 tons of refuse.

D. C. Botting, state mine inspector, reports that the total number of accidents in the coal mines in 1907 was 131, of which 36 were fatal. The death rate per 1,000 of employees was 6.06, and the number of tons mined for each life lost was 102,237. This makes an unfavorable comparison with the casualty statistics for 1906, and particularly with those for 1905. In 1906 the death rate per 1,000 of employees was 4.86 and the tonnage for each life lost was 148,917; in 1905, the death rate per 1,000 was 2.73, with a tonnage of 220,379 for each life lost.

The coal beds are found in the western and central portion of the state, and are mined in five principal fields—the North Puget Sound field, including the coal mines of Skagit and Whatcom counties; the South Puget Sound field, comprising the mines in King and Pierce counties; the Puget Sound basin, just east of Seattle; the Roslyn field, in Kittitas county, on the eastern slope of the Cascade mountains; and the Southwestern field embracing the counties of Lewis and Cowlitz.

The coals range from lignite to bituminous coking, and include some natural coke and anthracite. The bituminous coking are the only coking coals on the Pacific slope of the United States. They are found in the Wilkeson-Carbonado district, in the South Puget Sound field, and also in the North Puget Sound field, but coke is now made only in the district first named. The Wilkeson-Carbonado

coal runs high in ash and is usually washed before coking. The lignite or subbituminous coals of Newcastle and Renton, in the South Puget Sound field, are generally of high grade and well suited for domestic use. The steamship consumption in the trade with Alaska and the Orient is now the most important market for the high-grade bituminous coals of Washington.

## Georgia Coke.

The coke production of Georgia in 1907 amounted to 74,934 short tons, valued at \$413,371, according to the United States Geological Survey. Compared with 1906, which amounted to 70,280 tons, valued at \$277,921, the 1907 output exhibits an increase of 4,654 tons, or 6.62% in quantity, and of \$37,450, or more than 13% in value. The average price per ton was advanced from \$2.81 in 1904 to \$3.18 in 1905, to \$3.95 in 1906, and to \$4.21 in 1907.

Coal mining on an extensive scale is carried on in Dade and Walker counties, in the northwestern part of Georgia, and a good grade of coke is made from the slack produced in mining. The iron furnaces in and near Chattahoochee, Tenn., furnish the principle market for the coke. All of the coal used in coking in 1907, amounting to 130,031 tons, was washed before being charged into the ovens.

There are two coke making establishments in Georgia, both of which have been in operation since 1900, although 50 ovens of one establishment were idle during November and December, 1907, as a result of the depression in the iron trade.

## Coke in Pennsylvania.

Until the last year from 55 to 60% of the total coke production of Pennsylvania has come from the famous Connellsville district of Fayette and Westmoreland counties, but in 1907 the percentage was a little less than 50. This was not due to any falling off in the output of the Connellsville district, but rather to an increased production in some of the other districts, particularly the Lower Connellsville or Klondike district, which is located in Fayette county and is separated from the Connellsville basin proper by the Greensburg anticline.

The Upper Connellsville, or Latrobe district, is the northern extremity of the Connellsville trough or basin. The combined production of these three districts in 1907 amounted to 20,430,587 tons—77.06% of the total production of the state, and 50.1% of the total output of the United States.

Under the general supervision of State Geologist W. S. Blatchley a new geological survey of the coal fields of Indiana is now being made. The field work of the new survey is under the direction of Dr. George H. Ashley, assisted by E. F. Lyons, both of the United States Geological Survey.

Java produced 1,655,331 cases of petroleum in 1907, as against 1,994,689 cases in 1906.

## New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 25 cents with the title, number, and date of patent to The Mining World. Remittances may be made by coin, stamps, or postoffice money order.

WEEK, AUGUST 25, 1908.

Process for Hardening Tantalum. Werner von Bolton, Charlottenberg, Germany, assignor to Siemens & Halske. (856,765; filed Sept. 12, 1905.)

Belt Guide and Shifter. David Halliday, Shipman, Ill. (856,726; filed April 17, 1906.)

Conveying Apparatus. T. S. Miller, South Orange, N. J. (856,714; filed Jan. 16, 1904.)

Gas-Operated Rock Drilling Engine. R. S. Trott, Denver, Colo. (856,777; filed Dec. 26, 1906.)

Oil-Filter. August Bows, Portland, Ore. (856,721; filed Dec. 19, 1907.)

Smoke Purifying and Consuming Apparatus. Wilfrid Cyr, Notre Dame de Grace, Quebec. (856,805; filed June 23, 1907.)

Steam Trap. C. E. Fagan, Lebanon, N. H. (856,815; filed Dec. 10, 1907.)

Lubricator. W. W. Hodgdon, Somerville, Mass. (856,823; filed Nov. 25, 1907.)

Water Wheel. W. P. Spooner, Shellmouth, Manitoba, Canada. (856,847; filed March 22, 1907.)

Explosive. C. E. Blechl, Hamburg, Germany. (856,887; filed Aug. 30, 1906.)

Lubricator. Chester Crametock, Ridge-wood, N. J. (856,895; filed Oct. 12, 1907.)

Ore Pulverizing Machine. F. W. Thompson, Fort Williams, Ont. (856,954; filed Oct. 2, 1907.)

Apparatus for Treating Ores. Warren C. Tracey, Denver, Colo. (856,955; filed Mar. 19, 1908.)

Ore Separator. Jos. G. Evans, Baker City, Ore. (857,078; filed Nov. 7, 1907.)

Gas Producer. Frederick Powell, Portland, Ore. (857,097; filed Feb. 6, 1908.)

Apparatus for Handling Coal. Jas. E. Richards, London, Eng. (857,014; filed Aug. 5, 1907.)

Pneumatic Tool. Wm. H. Keller, Philadelphia, Pa., assignor to Chicago Pneumatic Tool Co. (857,107; filed Jan. 13, 1905.)

Electric Furnace. Johannes Harden, London, England. (857,203; filed May 8, 1908.)

Rotary Stamp Mill. P. J. Lonergan, Denver, Colo. (857,214; filed June 4, 1907.)

Ore Concentrator. F. E. McKinley, Guthrie, Okla., assignor to the Desert Gold Machine Co. (857,223; filed May 7, 1904.)

## Legal Decisions.

Mining Shaft: Dangerous Place.—The fact that the entrance to a mine shaft was unguarded upon a dark night was not sufficient to render such shaft so obviously dangerous or the hazard in going about it so apparent, that a person of ordinary prudence would not incur the risk. —*Monsey vs. Black Diamond Coal & Mining Co., Ky.*, 199 Southwestern 306.

Sale of Mining Stock: Fraud.—The owner of a mining stock induced a third person to purchase by fraudulently representing that the stock was not treasury stock, but instead of treasury stock he transferred to the purchaser his own private stock. In an action for damages, it was held that inasmuch as treasury stock under any circumstances is worth neither more nor less than the par stock, that the damages were wholly speculative and there could be no recovery. The court intimated that if the purchaser had acted promptly he might have rescinded the sale, reassigned the shares, and recovered the purchase money. —*Findlater vs. Dorland, Mich.*, 116 Northwestern 410.

Thoria (titanium oxide) extracted from monazite, is used chiefly in the manufacture of incandescent mantles for gas lighting.

\* Extracted from Mineral Resources of 1908 for 1907.



# Current Literature on Mining, Metallurgy, Etc.

*The Independent Smelter at Ogden, Utah.* Will C. Higgins. Although handling ore and concentrates on a small scale when compared with the larger works of Salt Lake valley, yet the returns are very satisfactory.—*Mg. Rev.*, Aug. 15, 1908. Pp. 2½; illus. 20 cts.

*Modern Ore Handling Machinery.* Walter G. Stephen. This is the second of a series of articles and takes up the work done by the Brown Hoisting Machinery Co., Cleveland, O., and presents some of the latest installations made by that company.—*Ir. Tr. Rev.*, Aug. 20, 1908. Pp. 4; illus. 20 cts.

*Treatment Locally of the Ores of Toluca, Mexico.* T. C. Graham. Shows the distribution of the ores produced and analysis of their metallic contents. Also gives an outline of the practice of crushing and milling by lixiviation.—*The Mining World*, Aug. 22, 1908, Pp. 1.

*Cottrell Process for Condensing Smelter Fumes.* Describes this process which is designed for the separation of suspended particles from gaseous bodies. The successful application of the process by the Selby Smelting & Lead Co. of San Francisco, for arresting the objectionable elements in the fumes escaping from its smelter, suggests a possible solution of the problem which has always been a source of annoyance, and often great expense, to many smelters in this and other countries.—*E. & M. J.*, Aug. 22, 1908. Pp. 3; illus. 20 cts.

*Concentrating With Hydraulic Jigs in Sardinia.* Erminio Ferraris. The method described is in use at the calamine works at Montepioni in Sardinia, in which two kinds of hydraulic jigs are employed. Features of construction are presented and the differences compared with jigs in general use.—*The Mining World*, Aug. 22, 1908. Pp. 1½; illus.

*The Genesis of the Copper Ores in Shasta County, West of the Sacramento River.* William Forstner. The ore deposits are in the form of massive pyrite bodies contained within in acidic extrusive rocks.—*A. & S. P.*, Aug. 22, 1908. Pp. 1½; 20 cts.

*The Shore Scleroscope.* J. F. Springer. An instrument for determining the measurement of hardness in metals. Some important applications are presented.—*Ir. Age*, Aug. 27, 1908. Pp. 4; illus. 20 cts.

*Development of Non-Metallic Packings.* W. E. Sunders. Describes the early form of packings, gives the classification of packings and tells how Watt overcame his troubles with packings.—*Power & Eng.*, Aug. 25, 1908. Pp. 2½; illus. 20 cts.

*Milling Practice in Nevada Goldfield Reduction Works.* E. S. Leaver. This is a custom plant, all ore being sampled and purchased in small lots. The treatment consists in crushing wet by stamps, amalgamation on plates, concentrating on Wilfley tables, fine crushing of the sand

*Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.*

*In ordering, give date of The Mining World in which the article has been mentioned. All orders are payable in advance.*

in a tube mill, re-amalgamation on plates, re-concentration on vanners, and cyaniding of the sand and slime.—*M. & S. P.*, Aug. 22, 1908. Pp. 1; illus. 20 cts.

*The Hematite Mines of Cumberland, England.* Lucius W. Mayer. In mining the large ore bodies the caving system is employed with varying methods for removing the pillars and supporting the ground. The ore bodies appear in every conceivable form occurring in vein-like formations—in the form of beds, and more often in irregular masses. It is in the faults that the ore has been given an opportunity to deposit.—*E. & M. J.*, Aug. 22, 1908. Pp. 6; illus. 20 cts.

*The Ore Deposits of Magdalena, New Mexico.* Phillip Argall. The mines were first worked in 1866 and the easily reduced lead carbonates were shortly after that date smelted in adobe furnaces and the resulting pig lead was shipped by ox teams to St. Louis. The hematite and zinc blende are found associated at the ground-water level, creating a zone of impoverishment instead of one of enrichment.—*E. & M. J.*, Aug. 22, 1908. Pp. 4; illus. 20 cts.

*Electrolytic Refining of Gold, Silver and Copper at the United States Mint at San Francisco.* Robert L. Whitehead. The sulphuric acid process, in use for over 30 years, has been completely replaced by the most modern equipment installed in any of the mints.—*Electro-chem. & Met. Ind.*, Sept., 1908. Pp. 5; illus. 35 cts.

*Smelter of the Penoles Co., Mapimi, Mex.* Claude T. Rice. Three smelters were formerly operated by the company, but efforts are being made to centralize the plants. Much construction work is going on and several improvements have been introduced.—*E. & M. J.*, Aug. 22, 1908. Pp. 2; illus. 20 cts.

*Explosives, and How They Are Guarded by the State Government.* E. A. Mann. The government of Western Australia demands that three tests be made (1) for uniformity and correctness of compositions; (2) for freedom from acid; (3) for freedom from exudation and other physical defects, due either to manufacture, unfavorable conditions of storage, or accidental damage.—*W. A. Mg., Blkg. & Eng. Jnl.*, July 18, 1908. Pp. 2; 20 cts.

*The Nipissing Mines and Their Numerous Veins.* Alex. Gray. Nipissing mining areas embrace elements likely to determine most of the issues associated

with Cobalt's silver industry. Property produced up to Aug. 1, 6,757,971 ozs. silver, with a value of \$3,780,176; dividends distributed, \$2,226,000 from 6,206 tons of ore.—*The Mining World*, Aug. 22, 1908. Pp. 3½; illus.

*How to Make an Inexpensive Gate of Poles.* Matt W. Anderson. A light strong gate, easily made and put in place, has many advantages over cumbersome bars, too frequently used instead. The writer gives simple directions for making a gate of poles or other light material and for setting it up so it will work easily and to best advantage.—*The Mining World*, Aug. 22, 1908. Pp. 1; illus.

*A New System of Modern Coke Ovens.* F. Fieschi. Gives the details of construction and operation which permits saving byproducts and excess gases. The question of horizontal or vertical flues is also discussed. The excess gases, which in ordinary recuperative ovens are seldom more than 20% of the total, increase with ordinary coking coal to 40% and sometimes more with coals of a bituminous character.—*E. & M. J.*, Aug. 22, 1908. Pp. 4½; illus. 20 cts.

*Modern Gas Engines vs. Steam Turbines in Mining.* Frank C. Perkins. The fuel economy of heat engines is shown by the comparative figures submitted for various gas engines, steam engines and steam turbines, giving the thermal efficiency of heat machines and showing the kg. cal. required per effective horsepower.—*The Mining World*, Aug. 22, 1908. Pp. 3; illus.

*Grinding.* Oskar Angel. The suitability of a mill depends upon the nature of the material to be handled, the capacity required and the fineness desired. Grinding appliances can be divided into two types—machines for crushing and coarse grinding, and machines for the production of a fine powder.—*Electrochem. & Met. Ind.*, Sept., 1908. Pp. 3½; illus. 35 cts.

*The Etheridge Goldfield, Queensland.* W. E. Cameron. Occupies an area of over 13,000 sq. miles. The bulk of the mining has been for gold. The high prices ruling lately for the industrial metals has led to a certain amount of prospecting for silver-lead and copper.—*Queensland Gov. Mnl.*, July, 1908. Pp. 9; illus. 20 cts.

*Electricity in Mines.* Ralph Bennett. Presents some points on electric lighting and ore haulage and pumping by electricity.—*Am. Mg. Rev.*, Aug. 22, 1908. Pp. 1; 20 cts.

*Elementary Hydraulics for the Engineer.* Franklin Van Winkle. Gives a graphical presentation of the principles governing flow, with tables of heads, velocities, and coefficient of discharge.—*Power & Eng.*, Aug. 25, 1908. Pp. 4½; illus. 20 cts.

*The Recognition of Minerals.* C. G. Moor. A collection of notes and simple tests for the use of prospectors.—*Mg. Jnl.*, Aug. 22, 1908. Pp. 4, first part. 20 cts.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as new items of sales made, and illustrated descriptions of new inventions or improvements.

### Air Drill Lubrication.

An ingenious and effective combination of a valve and lubricating device for air drills, is being manufactured by the Western Lubricating Valve Co., of Denver, Colo., and is meeting with much success.

The oil well of the valve holds suffi-

self-grinding properties. The "Western" is provided with a hollow turning plug or key through which the air flows against the stem proper which holds the valve in its seat at all times, and thus every operation of turning on and off the air is essentially the same as grinding a new seat.

The valve is provided with swivel or "knuckle" connections—one to the machine and another for hose connection—by means of which the wear on the threads in the air chest of the machine becomes nil and the hose is absolutely prevented from kinking.

### A New Prospector's Mill.

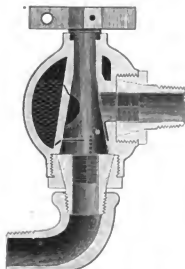
The accompanying illustration represents the latest pattern of prospector's mills, and is intended to meet the needs of the ordinary prospector with limited means. It is built in sections, the heaviest piece being 280 lbs., total weight 1,900 lbs. The stamp is operated by means of an ordinary crank, the box being set between two spiral springs and each end of the springs provided with rubber bearings, thus avoiding metallic contact and



No. 1 Valve for Large Machines.

cient oil to operate the drill for a shift, and the oil is fed into the machine a drop at a time.

This valve is held in any position desired by the air pressure flowing through the hollow turning plug and against the stem, which prevents its opening or closing except when desired by the machine man. This feature effectively prevents



Sectional View of Original Model.

the breaking of front heads and side rods or other machine parts of the steel "shanks" when "collaring" a hole.

Another feature is its self-seating or

preventing crystallization of the springs.

The center of stamp is attached to frame by arms journaled in frame, thus keeping it in line with the crank, and at the same time imparting a horizontal rubbing motion to each blow, which adds very materially to its capacity and better fits the material for amalgamation.

It is also provided with triple discharge and is easily cleaned up. Three horse power will operate it and the average speed should be about 150 per minute. The force of each blow is about 2,000 lbs. and its capacity about 300 lbs. per hour. It is built by the Harrison Machine Works, 721 North Main street, Los Angeles, California.



Wallace Prospector's Mill.

### Trade Publications.

**Stamp Mills.** The Denver Engineering Works Co., Denver, Colo. Bulletin No. 1038. Pp. 56; illustrated.

This is a valuable work on modern stamp mill methods and practices. A short description of the various steps in the process of stamp milling is followed by detailed descriptions of the various machines required in a stamp mill, accompanied by well arranged half-tones of the actual machine and parts. A complete specification is also given for a 10-stamp mill, with general drawings, which should be a great help to the prospective purchaser or to any one contemplating the installation of a stamp mill. The latter part of the bulletin is devoted to sectional drawings and photographs of a number of mills designed by the company, giving a good idea of the several methods of construction.

**Handling Coal and Ores.** The Jeffrey Mfg. Co., Columbus, O. Bulletin 25; illustrated.

Contains the advanced pages for catalogs Nos. 28-A and 28, now in press, and is devoted to the machinery manufactured by the company for the handling of coal and ores. This includes the Jeffrey coal tippie, steel head frame, picking table, drop rail cages, screens, weigh baskets, steel pan carriers, shaking screens, loading chutes, hoisting towers, overlapping bucket carriers, etc. A majority of the illustrations are from installations made by the company.

**Industrial Railways.** Ernst Weiner Co., 66 Broad street, New York city. Folder; illustrated.

This is one of the company's new form folders and is very attractively printed. The cover is very appropriate for the present hot weather period and will no doubt be the cause of many acceptances of the company's invitation. Three of the company's specialties are shown—a platform car, portable track equipped with special steel corrugated tires and a side dump car.

**Fans.** Garden City Fan Co., 1217 Fisher building, Chicago. Folder; illustrated.

Gives a brief description of the company's steel plate Cycloidal shavings exhausters and fan wheels. A table of sizes and prices is also given. The company guarantees that its equipment will require less power, will run as near noiseless and will do more work than any fan of equal size.

**Huntington Mills.** Power & Mining Machinery Co., Cudahy, Wis. Bulletin 27. Pp. 16; illustrated.

Is devoted to a description and illustration of the company's improved Huntington mill, which is equipped with a heavy cast iron base in place of the wood frame for supporting the mill. The countershaft is supported by a heavy bracket cast integral with the base. A number of other improvements are claimed.

**Electric Mining Machinery.** Goodman Manufacturing Co., Chicago. Bulletins; illustrated.

Bulletin 301 is devoted to a presentation of the Goodman rack rail haulage

system, the essentials of which, as stated by the company, are a strong and durable rack rail, supported by the track ties and securely anchored to them, and a powerful electric locomotive whose motor drives steel sprocket wheels which engage the rack rail to produce the forward motion. The Goodman gathering locomotives are fully illustrated and described in Bulletin 501.

### Industrial Notes.

The El Paso Foundry & Machinery Co., El Paso, Texas, has awarded the contract to the Allis-Chalmers Co. for a Corliss engine unit and full complement for electrical generators, exciters, etc.

Joshua Hendy Iron Works, San Francisco, Cal., has been awarded the contract for the installation of one of its 20-stamp mills at the property of the Florence-Goldfield Mining Co., Goldfield, Nev.

The Trenton Iron Co., Trenton, N. J., has just completed extensive additions and improvements to its wire department which doubles its capacity and enables the company to make more prompt shipments.

The Western Electric Co., 359 South Clinton street, Chicago, has let contracts for the construction of a five-story fire-proof factory to be built in connection with its plant at Hawthorne, Ill., to cost \$400,000.

E. Kepler, formerly of Milwaukee, is at the head of a company, and is now constructing a plant for the manufacture of gas engines at Corliss, Wis. The new plant will employ 100 men when complete.

A charter has been granted to the Illinois Stoker Co., Alton, Ill., to manufacture mechanical stokers. The company is capitalized at \$50,000, and has these incorporators: James Duncan, William M. Duncan and George D. Duncan.

The Diester Concentrator Co., Fort Wayne, Ind., reports that it has received an order for 16 of its No. 1 tables from the Champion Copper Co., Freda, Mich., also an order for three of its No. 3 tables from the Arizona Gold Mines & Milling Co., Patagonia, Ariz.

The United Roofing and Manufacturing Co. is offering to every purchaser of 3-ply Congo roofing a National Surety Co. guarantee bond, which covers a period of ten years. The Congo people have adopted this plan of giving the buyer satisfaction as well as increasing their sales. By writing to the United Roofing & Manufacturing Co., Philadelphia, Pa., information will be given regarding same and sample free.

Chalmers & Williams, Commercial National Bank building, Chicago, report among other recent large orders the following: Guanajuato Cons. Mining & Milling Co., Guanajuato, Mex., two 48 by 25; Rosedale Mining & Milling Co., Magdalena, New Mexico, one 36 by 20, and Makeever Bros., New York city, for El Tigre mine, one 36 by 18 Bart rapid cyanide filters. Catalog giving complete description of this filter will be mailed you on receipt of your request by the company.

### Personal.

Walter Harvey Weed of New York city, is at Bisbee, Ariz.

E. W. Orr of Salt Lake, Utah, is examining a copper property in Colorado.

E. J. Raddatz of Salt Lake, Utah, is making a mine examination in Montana.

N. W. Boyer has assumed charge of the Milltown Fraction mine at Goldfield, Nev.

E. F. Baker has assumed the management of the Copperton mill of the Utah Copper Co.

Edmund K. Judd of New York city is examining a copper property in Newfoundland.

Peter Kendrick has been appointed superintendent of the King David mine at Frisco, Utah.

Chas. H. Doolittle, manager of the Utah & Eastern Copper Co., is in Los Angeles, Cal.

C. Lorimer Colburn, mining engineer, Denver, Colo., is on a professional visit to Marble, Nev.

H. S. Guess will on October 15 succeed to the management of the Federal Lead Co., Flat River, Mo.

H. Foster Bain, director of the Illinois Geological Survey, is on a visit to various points in the west.

Robert T. Hill of New York city is visiting various points in the west and southwest on professional business.

Professor J. P. Rowe, geologist of the University of Montana, is studying the geology of the Coeur d'Alene district, Idaho.

Lafayette Hanchett, general manager of the Newhouse companies, is in St. Paul, Minn., with his family on a vacation trip.

Horace J. Stevens, author and publisher of the Copper Hand Book, Houghton, Mich., is looking over the Butte copper district.

Charles A. Short has resigned as manager of the Jennie Gold Mines Co., Gold Springs, Utah, and will be succeeded by W. F. Odin.

Donald B. Gillies, manager of the San Toy Mining Co., Chihuahua, Mex., has returned to the property after a successful operation for appendicitis.

N. P. Flodin of the Lake Shore Engine Works, Marquette, Mich., was in Chicago several days this week on a short vacation. He was accompanied by Mrs. Flodin.

John H. Nordquist, operating extensively in the Coeur d'Alene district, Idaho, was in Spokane, Wash., recently, on business connected with his properties.

G. Weaver Loper, manager of the Colville Mining & Smelting Co., has returned to the property of the company at Colville, Wash., from his New York visit.

Norval J. Welsh has returned to San Antonio, Texas, after a six weeks' professional trip spent in the western part of the state of Chihuahua, Mexico, and will

shortly be at the Engineers' Club, New York city, for an indefinite stay.

Messrs. J. O. and C. C. Medbery of the Miners' Smelting Furnace Co., New York city, are at Vail, Ariz., supervising the installation of Medbery furnaces for the Helvetia Copper Co.

A. H. Godde, general manager of the Prince Cons. and Ohio-Kentucky companies, operating properties in Utah, is in Louisville, Ky., in conference with officials of the company.

Edmund B. Kirby has resigned as manager of the Federal Lead Co., Flat River, Mo., to take effect Oct. 15, at which time he will open offices at 701 Security building, St. Louis, Mo., and will devote his attention to consulting work.

Harold F. Carpenter, mining engineer, of London and Paris, arrived in Denver, Colo., recently from England, after a protracted tour inspecting mines in Norway, Austria-Hungary and Andalusia, Spain. He is now engaged in the examination of mines in Colorado for a London financial syndicate. His temporary address is care of F. Prestidge, 607 E. and C. building, Denver, Colo.

Dr. Franklin R. Carpenter has completed a survey of the Utah oil fields of Wyoming and also an examination of the Asmus Boysen concession in the Big Horn canyon. He is now examining a property in the Seven Troughs district, Nevada, for cazen investors, with a view of installing a free-milling gold plant followed by cyanide, something after the plan at the Homestake mine in South Dakota. Dr. Carpenter will return to Denver about September 10.

### Technical Schools and Societies.

*Wisconsin Mining and Trade School.*—The second annual bulletin of the school has been issued, announcing the opening of the fall term with Harold C. George as director. The entrance requirements are given, as is a description of the building and equipment.

*American Electrochemical Society.*—The fall meeting of the society will be held in New York city Oct. 29, 30 and 31. The spring meeting, next year, will be held at Niagara Falls. The 15th volume of the Transactions has just been issued. It is a volume of 48 pages and contains the complete record of the last meeting in Albany.

*The Institution of Mining Engineers.*—The 19th annual meeting of the Institute is being held this week in Edinburgh, Scotland. The following papers are to be read: "Coal Dust to Date and Its Treatment with Calcium Chloride," by Henry Hall, inspector of mines; "On the Practical Use and Value of Colliery Rescue Apparatus," by George Blake Walker; "The Wemyss Coalfield," by John Gemmell; "The Working of Oil Shale at Pumpherson," by William Caldwell; "Deep Diamond Boring," by James Thomson.

Veins and impregnated zones are not uncommon in the placer districts ofeward Peninsula, Alaska.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ALASKA.

### Juneau.

Reports from the Valdez Creek placer country are to the effect that better showings are being made. More prospecting is being done and the permanency of a good camp is assured. It is reported that the Alaska Commercial Co., which has a station at Shusnetna, from which point outfits can be taken in to Valdez creek, will place a small steamer on the upper Shusnetna river, which will greatly aid transportation to the new diggings.

The Lucky Chance mines of the Providence Sitka Mining Co., on Silver bay are to be sold at marshal's sale on Sept. 18.

Beach sluicing is being done on Nevada creek by Bob Saunders and a force of men, and it is reported that better than good wages are being made.

Reports from Dawson state that Jack Horn has 35 men at work open cutting on his properties below Discovery on Bonanza creek and is getting excellent results. Mr. Horn estimates that fully one-third of his returns are from bed rock which he takes up to the depth of 5 or 6 ft. with pick and shovel. Below this depth no gold is found.

The finding of some very rich ore is reported from the Mt. St. Elias country, some distance inland from Yakutat. The region, although rumored to have great possibilities, is so difficultly accessible that but little is known of it.

## ARIZONA.

### Bisbee.

According to the statement just completed by the territorial auditor, Cochise county leads in the production of copper in Arizona. The statement gives Arizona's output for 1907 at 252,784,698 lbs., Cochise county producing 111,581,402 lbs., or almost one-half of the territory's output. Graham county comes second, with an output of 61,682,552 lbs. Gila and Yavapai counties run pretty close for third place, the former's output being 35,743,241 lbs. and the latter's 35,724,369 lbs. Of the companies the Copper Queen leads with 66,916,972 lbs., the United Verde second with 33,015,457 lbs., and the Arizona Copper Co. third with 30,794,092 lbs. The Calumet & Arizona Co. comes fourth with 30,089,473 lbs.

In the total output of mineral wealth in the territory, Cochise county also leads, the value of the output for 1907 being almost twice that of Graham county. Cochise county's output is valued at \$23,798,499.40, while that of Graham county is \$12,417,653.90.

The largest producer of silver during 1907 was the Tombstone Cons. Co., leading with 454,412 ozs. The second largest producer of silver is the United Verde Copper Co., with 356,038 ozs., while the Copper Queen Co. of Bisbee comes third with 338,723 ozs.

At the Wolverine & Arizona work is steadily going on on the incline winze,

which has reached a depth of 80 ft. The indications are favorable for soon reaching the ore body that has been looked for.

The Copper Queen Co. has placed another furnace in use at its smelter at Douglas, making eight at present. This makes the smelter running at almost full force, the number in use when running full blast being eight out of the nine, one being held in reserve. A new converter stand is being built. Two converters were placed in use during the past week, making six at present instead of four.

### Morencí.

The Detroit Copper Mining Co. has been keeping up a steady production of copper even during the period of depression in the price of copper.

The New York-Arizona Gold & Copper Co., organized less than a year ago, has steadily carried forward development work and has recently begun to make preparations for more permanent work and to add improvements and machinery. The management has been assured that the money will be forthcoming for the purchase and installation of a stamp mill, cyanide plant and other necessary equipment for treating the ores. So far the ores are principally gold and silver, but are expected to turn to copper with depth.

The Gold Belt Development & Reduction Co., whose property joins that of the New York-Arizona Co. on the west, cut down forces during the low prices and let some leases to keep up development. Preparations are now being made to resume active work.

### Phoenix.

The shaft on the Colonial mine at Quartzite, Yuma county, is down 500 ft. and crosscutting has begun and rich ore is being taken out.

Much prospecting is being done in the Trigo range of mountains in eastern Yuma county, and a number of properties have been located. This section is about 20 miles southwest of Quartzite, 14 miles from Ehrenberg and six miles from the Colorado river. Coarse placer gold discoveries started the interest in prospecting.

Dan Genung has sold part of his interests in his group of mines in Rich Hill district, Yavapai county, to the Mildred Gold Mining Co. It is claimed that the ore in these mines will average \$35 gold to the ton. There is 50 tons of second-class ore on the dump. The property is equipped with a hoist and work will be rushed as soon as returns from a shipment of the ore are had. The claims have been worked with profit since 1865.

## CALIFORNIA.

### Auburn.

The representatives of a San Francisco company is negotiating for the purchase of the Robert Waugh group of quartz mines and the Morgan & Green placer

claims near Bold mountain. All of these properties have been producers, and with the installation of more improved methods are expected to surpass their former records.

W. A. Fletcher is arranging for the installation of an electric plant on the North Fork of the Middle Fork to furnish power to operate the Homestake mine at Last Chance, the Dardanelles at Forrest Hill and the Paragon at Bath. A compressor has been installed at the Homestake and developments are being pushed. At the Dardanelles the working force was recently increased and the Blackhawk tunnel is being pushed. Mr. Fletcher has made the second payment on the Home Ticket mine and is also pushing work at that property.

The Parmelee mine is being rapidly placed in shape for active operations. Compressors and other machinery are being installed and arrangements perfected for the working of a large force of men. The property is well known and has produced excellent ore in the past. A large vein carrying antimony, molybdenite and galena has been located on the Bear river, just across from Landers, by T. Harris. Development is under way.

At the Dairy Farm developments continue and a large reserve of good ore is being developed. Practically all of the work is going on above the 300 level. The Cash Rock dredge is working steadily and handling a large quantity of rich gravel. Good values are being recovered.

At the Hidden Treasure 40 men are employed and considerable exploration and development work is going on. Large reserves of ore have been opened up.

Work at the Azalen has been temporarily suspended pending the conclusion of arrangements for the working of the properties on a more advanced scale.

The Lawrence & Gaylord tunnel is in 300 ft. and is expected to intersect the vein within another 100 ft. It is now being driven through a soft tale, which is being removed with augers. Rapid progress is being made.

Considerable placer mining is going on at various points in the county and general conditions are very encouraging. Several important deals have been consummated during the past six months, with others pending.

### Placerville.

Considerable activity is manifest in the Placerville district and numerous good properties are receiving attention. Several shipments of machinery for the Gold Hill mine in the Bear creek district have arrived at Placerville during the past few days and will be immediately placed in position at the mine. Developments are under way at the mine, and the management expects soon to have the property on a producing basis. The mine contains a strong ledge of medium-grade ore.

The Garden Valley Gold Mining Co. has commenced work on the recently-ac-

quired Hume claims, present activity being on the Old Lady claim, where a good body of ore has been opened up. As soon as a good reserve of ore has been opened here, active work will be pushed at other points on the group. H. H. Hicks is superintendent.

At the Woodside-Eureka the Eureka shaft is being rapidly unwatered and it is expected that the ore bodies in the lower workings will soon be available. The company is carrying on work at several points. Eastern people principally are interested.

At the Rittner mine the rich ore body recently developed on the 200 level is sufficient to keep the mill running steadily. Developments are under way below this point.

It is stated that the litigation affecting the Zentcraft mine, in the western section of El Dorado county, has been settled and that a strong company will soon proceed to operate the mine on a large scale. The Zentcraft was at one time one of the richest producers in the county, but difficulties between the owners resulted in its closing when prospects were brightest. Its resumption on an important scale is expected to add materially to the annual yield of the district.

#### Grass Valley.

Within a few days the work of unwatering and retimbering the shaft of the Idaho-Maryland mine to the 1,000 level will be well under way. Three shifts will be employed. A large force of miners will also be put to work reopening the 700 level and running a drift to strike the rich vein developed at the 500-ft. point. On the latter level the vein has widened to 10 ft. and is steadily gaining in size as additional depth is gained. The mill is operating steadily on good ore and more stamps will be put in commission in the near future and the working force will be largely increased. From the 1,000 level it is planned to continue the shaft on through virgin territory. A large reserve of fair-grade ore is blocked out in the old workings and will be soon available for treatment. Bray Wilkins is general manager.

The rich ore body developed on the 200 and 300 levels at the Kenosha has been intersected by a drift on the 400 level. It is strong and well-defined with the pay shoot 12 ins. wide. Values run \$50 and upward to the ton. The shaft, now considerably beyond the 400 ft. point, will be carried down 800 ft. before the present sinking is suspended. The working force is being increased as rapidly as places can be made for the men. George W. Root is superintendent.

Considerable work of a development nature is being carried on at the Buckeye and Cold Springs properties in the Nevada City district by an eastern company. At the Buckeye an ore shoot is being developed by a drift that will be extended with the expectation of striking the Cold Springs channel. The Buckeye is a quartz and the Cold Springs a placer proposition. W. G. Motley is general manager.

Arrangements are being made to resume early operations at the Gaston mine. The mill is being repaired. The lower

adit is being pushed ahead at the rate of 6 ft. per day. It is in about 1,600 ft. with approximately 2,200 ft. still to go.

Hannan, Murphy and associates of San Francisco have bonded the Calvert & Sharkey gravel mine at Canada hill and will immediately take steps to thoroughly open it up. The tunnel will be driven 200 to 300 ft. to strike the channel.

The Mayflower mine at Canada hill has been bonded to a syndicate of Honolulu people and will be energetically developed. This property is considered one of the most promising in the district and has already produced considerable ore.

Eastern people have bonded the Orient mine and expect to have it on a productive basis in the near future.

Local people have bonded the Hill mine, located in the heart of the city of Grass Valley, and are making arrangements for its extensive development. The property contains a strong ledge of good grade ore and when worked several years ago gave excellent promise.

#### Redding.

Ore is being extracted from a 12-ft. vein on the 1,400 level of the Hazel mine. Values average around \$15 to the ton. Some 110 men are employed and more will be taken on as soon as the 10 additional stamps have been added to the 20-stamp mill now in operation. During the past seven years this property has produced \$1,200,000 in gold and has paid to stockholders over \$465,000 in dividends. The ore body is apparently growing wider with increasing depth without losing any of its value.

The Black Tom Mining Co. has paid off its indebtedness and has resumed operations on an extensive scale at the Niagara mine. Twelve men are at present employed, and more will be put to work in the near future. A 10-stamp mill has been ordered and will soon be installed. Lutellus Smith of Chicago is president and general manager of the company. Wisconsin people are chiefly interested.

The Balaklala Co. is gradually getting near to the producing stage, and it is thought that the first furnace will be blown in before Sept. 15. From 10 to 50 men are now employed, but it is probable that this force will be increased to from 200 to 300. Bunkers at Trinity and Balaklala mines are full of sulphide ore of good grade and coke has been coming in for a month now. The limestone contractors received notice to deliver 200 tons a day from Aug. 15. Silicious ores are now being contracted for. R. N. Bishop is manager.

At the Mammoth plant, near Kennet, a transformer blowing out was the cause of two furnaces being shut down, one for about a week and the other two weeks, but all are again at work. This plant is working nearer to its full capacity than at any time since its installation.

The recent bonding by the United States Exploration Co. one of the subsidiary companies of the United States Smelting Co., of a gold mine on the Salmon river in Si-kiyou county, north of Shasta county, about 100 miles from the Mammoth smelter, is taken as a healthy sign in that locality, as it is reported that A. P. An-

derson, the company's expert, has practically accepted the property, which means a large milling installation.

Within the past week a large bucket dredge, working near this city and belonging to the Shasta Dredging Co., was destroyed by fire. It had recently been overhauled at an expense of \$25,000 and had been worked only two full months. It replaced another also burned.

## COLORADO.

#### Denver.

A combination of properties in the Hahn's Peak section of Routt county, known as the Royal Flush, is sufficiently developed to warrant consideration of plans for a large concentrating mill. It is owned by H. O. Granberg of Oshkosh, Wis.; John M. Borgman and G. A. Duval of Kewanee, Ill.; F. A. Sedgwick of Clinton, Wis., and S. S. Trilkey of Alvarado, Minn., all of whom visited the place last week and inspected the workings. Following tests of the products, a considerable part of the funds required for further development and for reduction works were subscribed. The full amount will be paid in before the end of this year and material for the mill is being arranged for in order that it may be completed early next spring. Mr. Granberg is the manager and Patrick McGill resident superintendent. The method of treatment has not yet been determined.

#### Cripple Creek.

As the deep drainage tunnel advances the large mine operators are beginning to outline plans for new machinery plants for deep sinking, present appliances being in some cases inadequate for use below 1,000 to 1,200 ft. It is reported that agents of eastern machinery houses have been in the district and that the managers of three of the large mines have already placed orders.

Charles Walden, former manager of the Last Dollar, has taken charge of the Rose Nicol on the northwestern slope of Battle mountain. The machinery has been thoroughly overhauled and extensive underground work entered upon.

A side track from the main line of the Colorado Springs & Cripple Creek railroad to the Wishlone mill on Tenderfoot hill is under construction. The plant, built by St. Louis capitalists, will, as soon as the track is laid, enter the market for low-grade ores.

Intending lessees are making systematic examination of old, abandoned workings with encouraging results. The low treatment rate has made possible the shipment of low grades, and in consequence a number of long idle properties are being rejuvenated.

Whitfield and Sherman, operating on the Silver Tip of the United Gold Mining Co. on Bull hill, are shipping 15 cars per month from a large shoot 8 to 10 ft. in width that has been exposed on three levels. The yield is from \$18 to \$50 per ton.

According to figures given out by agents of the allied lines an average of 72 cars of ore a day has been hauled by the va-

rious railroads. The output for August is much larger than that of July.

The intermediate shaft of the drainage tunnel will within the next 15 days have reached the 790-ft. level, corresponding to the level of the great bore, and Contractor A. E. Carlton is already preparing to operate two new headings from this shaft. An electric hoist having a capacity of 200 tons in 24 hours is to be built especially for this shaft.

Richard Blanchard and associates, leasing on the Hiawatha on the southwestern slope of Beacon hill, are sinking a new shaft, preparatory to the exploitation of a large dike 12 to 18 ft. wide, carrying values of \$6 up to an ounce per ton. Machinery will shortly be installed, but the lessees have not yet decided whether a steam or an electric hoist will be purchased.

The Elton Cons. shaft, which has been closed for repairs since the first of August, is again in full operation. Work is being prosecuted on practically all levels from the surface to the 900 level, where several veins have been opened up.

The Longfellow Nos. 1 and 2, on the Stratton estate, are again in operation after a long shut down. These mines are located on Bull hill, adjoining the Vindicator estate, below the town of Independence. Holman & Moore, leasing on the north end of No. 2, are drifting on two veins. The shaft on the south end is being retimbered by Lessee McGraw and associates and machinery will later on be installed.

An immense amount of development work is in progress throughout the district—more than in any other part of the state, since its product, being gold alone, is not affected as are the others by the low price of subsidiary metals.

#### Lake City.

General F. J. Pienaar, owning mines in Hinsdale county, is seeking expert advice as to the kind of a reduction plant that will best work the complex ores he is raising. He is not sure whether to build a concentrator, a pyritic smelter or install electric separating machinery. When, by a series of tests, the proper method of treatment is ascertained, he will purchase and install the necessary machinery. He also contemplates buying for his company the Tolosco power plant, but failing in this, he will build one of large capacity to run the Black Wonder mill and mine. His idea is to enlarge the capacity of the mill 200%.

#### Ourray.

W. S. McCarthy and E. C. Bacon have leased the Poland mine on the western slope of Engineer mountain and are now putting it in order for production.

With steady shipments of ore being made from the Genesee, a large force at work on the Yankee Girl clearing out the water and the old accounts against the Red Mountain Railway Mining & Smelting Co. being paid off, Red mountain district is brightening up.

Within the present week at least 100 men will be put into the Crawford mines.

The National Belle and Gold Lion will shortly begin operating and later on the entire group will be actively worked.

It is understood that the ore in the

Genesee is of high grade, although no assays have been made. Shipments began after the second day's work was done.

#### Brackenridge.

The success of the Wellington in its development of the Liberty ore shoot has caused the company to explore in a northerly direction. Out of the Liberty ore has been taken that ran high in lead.

A cleanup at the Reliance and also one by the Colorado Gold Dredging Co. a short time ago yielded gold bricks which were sent to the mint at Denver. The Reliance had made a run of 10 days and its brick weighed 28 lbs. avoirdupois, while that of the new dredges for about the same length of time weighed 24 lbs.

#### Red Cliff.

Red Cliff camp is in better condition than for many years. A great strike has been made in the Wyoming mine by Lees-James Law and J. W. Dowd. A vein 3½ ft. wide has been opened up which carries rich chlorides and sulphides. A short time ago lessees on the Champion struck a vein of high-grade ore from which they are shipping.

The Black Iron mine is worked by the Colorado Fuel & Iron Co., which will soon increase its force.

The Iron Mask people are retimbering their main incline and are to begin excavating for a new mill. A large number of mines, long idle, are being worked.

The Murray Mining & Milling Co. of Denver is building an amalgamating and concentrating mill in Eagle canon near Red Cliff.

The Holy Cross district is also coming to the front. Thomas Keating, owning the White Quail and Rising Sun, has struck a 3-ft. vein of gold ore that runs 90° to the ton.

J. W. Bailey of New York has a gas engine, air drills and other mine machinery at the Red Cliff depot waiting to be hauled to the Holy Cross, where it will be installed at the Grand Trunk mine.

#### Central City.

A Leyner compressor and complete machinery outfit has been received for the Buckley mine on Gunnell hill, lately purchased by W. M. Murphy and associates. When this is placed work in the mine will be pushed. There is a large quantity of low-grade ore in the workings and the owners are already figuring on the purchase of a mill to handle it. John Laughran of Central City is manager.

At the big mill of the Fifty Gold Mining Co. in Black Hawk 40 stamps are employed. 25 on ore from the company's property and 15 on custom ore.

#### Georgetown.

The mill at the portal of the Burleigh tunnel has resumed operation. Some changes will be made. A hoisting plant will be installed to elevate the ore that comes from the tunnel to the top of the mill, and a tramway built to the Pelican tunnel and Zero dump.

The Honest John Tunnel Co. has made a strike in the Black Eagle. New machinery for the mill has arrived and is now being placed. The capacity of the mill will be increased and the saving improved.

## IDAHO.

#### Mullan.

The Missoula Copper Mining Co. has started crosscutting from the vein from the west drift and it is expected to be in the vicinity of the vein within a short distance.

The Panhandle Smelter Co. has purchased from the Allis-Chalmers Co. four ore roasters for the Ponderay plant. These roasters are now on the ground and will be ready for work within a short time. They will handle 350 tons of ore per day.

The tunnel of the Hector Mining Co. is in a distance of 350 ft. and crosscuts are being made to open two veins which are believed to cross the ground. The property is located between Mullan and Wallace on the north side of the river. The work is in charge of Arthur George.

The Mineral Farm Mining Co. is operating under the financial management of Jaquish & Carlson of Spokane, Wash. Louis C. Jaquish is manager of the development work at the mine. Irvin Whitmore of Mullan is secretary.

The Monitor Cons. Mining Co., whose mine was recently bonded to the Success Mining Co. of Wallace, has filed articles of incorporation with the county recorder. The property has been a steady shipper of copper ore for several years and has paid one dividend. The head office of the company is named as Spokane, Wash. The trustees are C. J. Heilenreich, Chas. Dougherty, B. E. Bairds, Otis Hill and H. C. Browne.

The Fox Copper Mining Co. has awarded a contract for the sinking of a winze a distance of 50 ft. The officers of the company are W. J. Hughes, president; W. E. Wilson, vice-president; Wm. G. Newberry, secretary-treasurer. The company's ground consists of nine claims near Saltsee, Mont.

The Park Copper Mining Co. has resumed work on a group of claims south of Mullan. A large amount of development work has been done and the lead opened in several surface tunnels, but has not yet been found in the lower tunnel. Hennessy & Keeley of Chicago and T. N. Barnard of Wallace are among the heavy stockholders.

#### Wallace.

According to E. J. Carter, one of the heavy stockholders, the Stewart mine, controlled by F. Augustus Heinze, is to be reopened once. The mine was closed a year ago by the action of the Coeur d'Alene Development Co. in bringing an action for injunction against the Stewart company to prevent the latter company from operating a mill built on ground belonging to the former. A settlement has at last been reached.

The Amy property on Pine creek, which was recently bonded to J. L. Safford, has been rebonded to J. H. Kinsley and associates of Spokane for \$200,000. Development work has been done to the extent of 1,500 ft. of tunnel, which has exposed several inches of galena.

#### Burke.

The Imperial Mining Co.'s group of six claims in Saw Mill gulch, 1¼ miles east of Burke, is developed by three tunnels.

No 1 tunnel is in 30 ft. on a vein showing well defined walls and well mineralized with sulphides and carbonates of lead and oxide of iron. Tunnel No. 2 is in 1,350 ft., including crosscuts and 400 ft. of drifting on the vein. Assays from the tunnel show from 35.2 to 48.6% lead with high values in silver. No. 3 tunnel is now being driven and will intersect the vein at a distance of 2,000 ft., giving a depth of 722 ft. below No. 2 tunnel. It will enter the company's property at the extreme west end. Drifting will be continued on the vein and the ore bodies exposed. A wagon road is being built from the county road to the property, a distance of 5,000 ft. There is plenty of water and timber on the property. A 3-drill Ingersoll-Rand air compressor to be driven by water power is being installed. Developments to date have opened an ore shoot 400 ft. in length and good values, but sufficient depth has not yet been gained to encounter the sulphide ores needed for concentration. Twelve men are employed. Bunk and cook houses and a blacksmith shop are being built. The officers of the company are: Henry Billberg, president; A. D. Munroe, vice-president; Homer G. Brown, secretary; John H. Nordquist, treasurer and manager.

Murray.

The workings on the Paragon mine are in good-looking galena ore and arrangements are being made to install a concentrator to be ready for the completion of the Idaho & Northern railway to this and the Chicago-London properties.

A strike of high-grade zinc ore has just been made on the Chicago-London property. L. W. Steadman is manager of both this and the Paragon properties.

A good showing is being made on the property of the Black Horse Mining Co., just above the Chicago-London property. The upper tunnel is in 300 ft. A 100-ft. raise from No. 2 tunnel follows a vein averaging 4 ft. in width, carrying both milling and shipping galena ore. The tunnel is in 600 ft., cutting the vein at the breast. The main tunnel at 1,100 ft. depth is in 736 ft. and is getting into the ledge. Sprinklings of galena are shown. In another 36 ft. it is expected that the vein showing in the upper tunnel will be struck. Patrick Burke of Mullan is manager.

Wardner.

The Liston Mining Co., Ltd., has made application for patent on the Anaconda group of lode claims, consisting of the Anaconda, St. Lawrence, Blue Bird and Diamond claims in the Evolution district, Shoshone county. Matt. Ramngarten is president of the company.

## LAKE SUPERIOR.

### COPPER.

Houghton, Mich.

The Franklin Mining Co. has ceased development work on the Allouez conglomerate bed and is at present engaged in opening up the Pewabic amygdaloid lode, paralleling this bed 475 ft. to the westward. The conglomerate has been the mainstay of this branch of the Franklin's

two mines, but gave indications of giving out several years ago, and has now grown so lean in copper content that it can no longer be mined at a profit.

The No. 3 Pewabic shaft has been reopened and a temporary shaft rockhouse and a steam hoisting plant was built and placed in operation during the past few months. Drifting is in progress at the 150 level, but openings to date are not sufficient to warrant definite statements regarding the future possibilities at this point. This lode has been opened quite extensively and worked at several points on the Quincy, Old Franklin and Rhodie Island properties, and by the Franklin Junior itself, developments at the 23d and 24th levels in the latter's No. 2 Pewabic shaft disclosing excellent copper ground.

At the Hancock mine a very good showing of both mass and stamp copper is noted in the lower workings in the West Branch opened by crosscuts on several levels in the No. 1 shaft. The company is stopping no rock and such operations will not begin until the single shaft now opened on this property has been enlarged to 3-compartment size from surface to the 10th level, below which the shaft down to the 14th level is being sunk full size. The No. 2 5-compartment shaft is being sunk vertically to intercept the west conglomerate lode at a depth of 2,000 ft. and the main lode at 2,500 ft. has attained a depth of 1,200 ft. and is being sunk at the rate of about 85 ft. monthly. This shaft is nearly 2,000 ft. west of the No. 1 shaft, and is being sunk through practically virgin territory. A number of new and hitherto unknown lodes have been disclosed in this shaft, but no drifting was done on them. All energy is being directed toward putting the shaft down to the lodes now being developed in the No. 1 shaft.

Good progress is being made at the Isle Royale's No. 4 and No. 6 shafts, both above and underground, and practically a new mine is in the making. This end of the property has been opened to an average depth of nearly 500 ft. and a good showing of copper rock obtains throughout. Drifting is in progress both ways at all three shafts on three levels, with underground connections between shafts limited to shafts Nos. 5 and 6, where the first level drift was recently holed through. The steel framework of the new rock houses and permanent hoisting plants is in the course of erection and will be up and enclosed before snow flies. Large new Nordberg hoisting engines with capacity for hoisting from 5,000 ft. of depth are already on the ground awaiting installation. No. 2 shaft is being sunk below the 24th level, and the drifts on the lower levels are working well under the old Huron mine openings abandoned many years ago. An average of 27 rock drills is being used in stopping and drifting at the various levels. Surface trenching in search of the Baltic lode continues on the eastern portion of the company's property, developments a few days ago disclosing a lode carrying some copper and possessing all the characteristics of the Baltic.

Conditions underground at the Superior continue highly satisfactory. No rock is being hoisted at the No. 1 shaft this

week and operations will be suspended temporarily during the time required to erect the framework of the large new rock house now in the course of construction. No. 2 shaft has been enlarged to 3-compartment size and is being cleaned out preparatory to sinking below the 200 level, at which depth the shaft is now bottomed. Lateral openings in this shaft have disclosed no copper.

### IRON.

Marquette, Mich.

It is estimated that some \$8,000,000 have already been expended by the United States Steel Corporation in opening the new Casino mining field, yet to date there have been forwarded only 13,000 tons of ore, of which 600 tons comprised the latest shipment. There is some ore in the immense pits now being stripped that is free of the sand characteristic of the deposits of the western Mesabi, but as it is necessary that the bulk of the contents of the beds be put through the washing process, it doubtless will not be until 1910, when the first half of the permanent washing plant is completed, that production from the district will be started in earnest. The most recent concession forwarded was the Holman mine ore that had been treated at the experimental plant. The permanent washery will, it is understood, consist of 10 units of an aggregate capacity of 1,000 tons per hour. Five units are to be built at a time.

A new shipper on the Mesabi is the New York State Steel Co.'s Kellogg property, midway between Biwahik and McKinley. Ore is also going forward from the same company's Larkin mine, formerly the Tesora, at Virginia, Minn. As heavy a production as possible will be made at the two mines the remainder of the season, and it is the hope that shipments will aggregate 100,000 tons.

Aside from the Larkin, there are nine properties on the active list in the Virginia field, and quite as many men are on the payrolls as in times past.

Mining or stripping operations are in progress at the Steel Corporation's Normal group and the Higgins, the Republic Iron & Steel Co.'s Franklin group and the Onondago, Corrigan, McKinney & Co.'s Commodore, Pickands, Mather & Co.'s Mioroca, Jones & Laughlin's Lincoln, M. A. Hanna & Co.'s Sliver, and the Alberta Iron Co.'s property in Section 16, 58-17. Work will be carried on at practically all of the tracts throughout the winter, and considerable ore will be stocked. Two shafts are going down at the Normal, where much open cut work also is in progress, and they will be capped with fine steel shafthouses.

The Mountain Iron is not shipping extensively this year, but it is adding new areas to its former developed limits. It is operated in the usual manner of these big open pits, and it is as much a railroad as a mining proposition. More than 5,000,000 cu. yds. of overburden have already been removed, and stripping is being pushed with steam shovels in commission night and day. The Ironquois, the fifth number of the Mountain Iron group, is being worked this year on a reduced scale.

It is a milling pit, controlled by the Buffalo & Susquehanna interests.

Operations have been resumed at the Buffalo & Susquehanna Co.'s Munro mine at Norway, Menominee range, after having been idle since last fall, and will be continued the remainder of the season by a force of about 75 men. The property is a milling proposition, hoisting being done from one shaft down 70 ft. The product is a hard ore of low grade, but the deposit is extensive.

Oglebay, Norton & Co. have taken on 200 men at the Bristol mine at Crystal Falls since work was resumed recently and shipping is in progress.

The Tobin mine of the Corrigan-McKinney group is being opened for larger production. The new shaft is almost down to the eighth level, where connection will be made with the present workings.

The miners' change house at Corrigan, McKinney & Co.'s new Baker mine at Stambaugh has been destroyed by fire, causing a loss of about \$5,000, the major portion of which is represented by the clothing owned by the men.

A big smokestack of concrete is in course of erection at Ferdinand Schlesinger's Newport mine. The structure will be 150 ft. high, the tallest on the Gogebic range.

## MISSOURI-KANSAS.

### Joplin, Mo.

The old Mosley mine has been sub-leased to Joplin men and will be operated. Pumps have been installed and the ground will be drained to the 188 level, where the ore will be removed.

An additional pump has been installed at the Bumble Bee mine. Five shafts are into the ore. The 100-ton mill will be started as soon as the ground is unwatered.

Two new shafts have been sunk on the Alladin mine at Spring City and rich lead and zinc ores were encountered in each. The Delta Mining Co., adjoining, has recently sunk a shaft into a rich lead and zinc deposit at the same level.

The Alpha mine in the Spring City camp, which has been closed down for some time, will be reopened soon.

The contract has been let for a 150-ton mill for the Lucky May, which will be erected by Oct. 1 and will be operated day and night. Two thousand tons of rich zinc are piled on the dump.

The success of the Try More mine in Leadville hollow has stimulated prospecting on the Granby and Leonard leases adjoining, on both of which shafts are being sunk. The Granby shaft was abandoned after striking a lime bar and a second one started. The Leonard shaft is nearing the ore level.

### Webb City, Mo.

The 40-acre tract of the Cosgrove land at Duwenge has been sub-leased. The United States Mining Co., sub-leasing one tract, has completed a 200-ton mill, which will soon be in operation. Brubaker Bros. have leased the remainder and will erect three mills, one of which is begun and will be of 300 tons capacity.

The old Innovator at Prosperity, which

was not a success under former management, has been taken over by the Marquis Mining Co. and a good run of ore is now being handled, which more than pays the expense of mining.

A steam shovel has been installed in the No. 2 shaft of the American Zinc, Lead & Smelting Co. at Prosperity. This is an innovation in the district and seems to be working well, though a number of changes will be made if more shovels are put to work.

### Alma, Mo.

The old Ingersoll mill at this place has been remodeled and made ready for operation.

More than 300 tons of tailings are being handled daily at the Julius S. mine at Neck City and an average of 10 tons of ore is saved.

The Old Buck mine in the same vicinity has reopened after a shut down of two weeks during which considerable repair work was done.

The old Comet mill at Neck City has been moved to a new location east of Alma. It will be operated by Alvin Hardy, Jr. The plant will henceforth be called the Clear Jack.

The old Beeville mine south of Carthage has been revived and in the past three weeks 36,000 lbs. of lead carbonate selling at \$36 per ton have been taken out.

Pumping on the Porter lot in Carthage has drained the ground in 33 days. This land was wonderfully rich 16 years ago, but has only been reopened recently. Work on the sub-leases progresses.

### Miami, Okla.

Pipes are being laid from Miami to the mines to supply fuel oil, which will be the permanent fuel used in this new field. Fuel oil has been used in other parts of the district in emergencies.

A reduction of the royalty on the Miami-VanCleave lease from 30 to 19% has been secured. A new mill shaft has been started. The company is making a study of the different mills in the camp so as to be able to build its own plant intelligently. The different character of the ore body in the camp calls for a different type of mill than is required elsewhere in the district.

Trial runs have been made of the Buckeye mill in Miami. The machinery is being adapted to the quality of the ore and it will be a short time before steady production can be expected.

Two shafts are being sunk on excellent drill prospects on the Magazine lease on the Miami royalty land.

Five 10-acre tracts have been sub-leased by the Miami-Peoria Royalty Co., recently organized at Carthage for extensive operations in the Miami field.

## MONTANA.

### Butte.

The mines of the Butte district produced 26,121,000 lbs. of copper during 30 days of operation in August, the mines having practically suspended for one day for a miners' holiday. While exact figures are not available, the estimates, showing the average daily ore production, the average yield of copper per ton, and

the total daily copper production, are as follows:

Companies.	Tons, ore.	Lbs. copper per ton.	Total lbs. copper.
Boston & Montana.....	1,600	76	121,600
Anaconda.....	4,000	80	320,000
Butte & Boston.....	700	66	46,200
Washoe.....	500	64	32,000
Parrot.....	450	64	28,800
Trenton.....	475	58	27,600
North Butte.....	1,425	94	133,950
Butte Conditon.....	900	80	72,000
Original.....	1,350	90	121,500
Pittsburg & Montana.....	200	95	19,000
Miscellaneous.....	250	95	23,750
Totals.....	11,850		870,700

A lower grade of ore is again being mined and treated. During the first few months after a resumption of mining, after the long shut down, an unusually high grade of ore was mined, the general average copper value of which was around 5%. It is now much lower. While Trenton and Parrot ore averages low in copper, it is higher in silver value than the ore from other mines. The amount of ore shipped daily to the Washoe smelter at Anaconda varies considerably, running from about 10,000 to 12,000 tons per day.

A telegram from New York announces that the option on a majority of the stock of the Butte-Montana Co. has been taken up and it is expected that work on the property will be resumed in six weeks or two months. There is so much said about Butte-Montana that very little reliance can be placed in any new announcement. The company has a good property in the Alex Scott claim, which lies in the heart of the Butte producing mines, adjoining the Colusa of the Boston & Montana Co. It is developed by a good shaft and several levels, and some good ore has been opened, but not in large bodies.

The troubles of the lumber men, which threatened to involve the Amalgamated Copper Co. with the miners' union again, are in a fair way to settlement. The striking lumbermen at Hamilton and St. Regis will be taken back and their grievances will be taken up later and adjusted.

The Boston & Montana smelter at Great Falls, which had been closed for three months on account of the damage done by the June flood, is gradually being restored to commission, but will not be running full capacity for several weeks yet. Operations have been resumed in the concentrator and reverberatory department. Due to work still going on on some steel structures and on a new flue in connection with the blast furnace department, that section of the plant has not yet been started. A force of about 700 men was necessary on the repair work during the past three months, indicating the great damage that was done to the smelter.

That F. Augustus Heinze is making progress in reorganizing his companies and rehabilitating his fortunes is indicated by the reports of the reorganization plans of the Ohio Copper Co., the Bingham Co., and the Davis-Daly Estates Copper Co. It is also announced that the affairs of the Stewart Mining Co. are in a fair way of settlement and that there will be a resumption of the mine and mill in the near future.

Chicago men interested in the Amador Mining Co. have been inspecting the prop-



erty with a hope of rescuing something from it for the stockholders. It is said there is a possibility that further development work may be done to ascertain if the property really is of value or not.

#### Kalispell.

A discovery of rich gold quartz was recently made by Micho brothers about nine miles north of Whitefish on a group of seven claims located by them. The values are principally in gold with some silver and copper. The find has attracted prospectors and many claims have been located.

The Kalispell & Dayton Mining & Milling Co. is driving a 900-ft. tunnel on its Jumbo and Jumbo Extension claims, five miles west of Dayton. The tunnel will cut the ore body at considerable depth and will also serve to drain the mine. There are two shafts on the claims, one down 65 ft. and the other 85 ft.

#### Missoula.

A rich vein of copper glance is reported to have been encountered at the 500 level of the Cape Nome mine in the Clinton district, five miles from Clinton.

It is reported that the Lacasse placer mining property on Cedar creek is to pass into the hands of Kansas City, Mo., people who will form a close corporation to operate the mines. Old-fashioned machinery is now being used, but a large dredge will be placed on the property. The Lacasse brothers will remain in charge of operations.

#### MISCELLANEOUS CAMPS.

**Saltese.**—The Copper Age and Edison group of 14 claims, adjoining the Monitor and Richmond on the east, is developed by a tunnel in 800 ft., which taps the vein at a depth of 800 ft., crosscutting 16 ft. of sulphide ore assaying 29% copper. Five men have been at work on the property for the past two years. Charles J. Heidenreich is manager and Morton Webster secretary.

**Libby.**—Rich gravel is reported on the placer property of M. S. Lindholm on Libby creek, 20 miles from Libby. A force of men has been at work prospecting the property for several months. The property was formerly owned by the Bear Creek Placer Mining Co.

**Basin.**—The contract Copper Mining Co. has just reopened its old workings, and is putting things in shape at its Bullion plant. A force of men is overhauling the machinery at the concentrator and will soon have it in readiness. Considerable work is being done in the mine. M. L. Hewitt is in charge of operations.

**Bozeman.**—The Silver King mine in the Silver Star district has been sold by the former owners, John Manning and John M. Woods, to Bozeman people, the consideration being \$2,000. Considerable development work has been done on the property during the past year.

## NEVADA.

#### Goldfield.

The Goldfield Cons. Co. has increased its force at the mill to 250 men and it is believed that the plant will be in shape for operation about the first of the year.

The work has been delayed by the failure of the material for the steel work to arrive. The mines are prepared to supply the necessary tonnage.

The Little Florence Mining Co. is doing some extensive development work on its Combination Fraction lease. The crosscut on the 520 level now within 20 ft. of the west side line, cut several good ledges. Drifts will be run on the leads at once. The upraise from the 200 level has been carried to the 170 level from which point a crosscut will be run to catch the Johnson ledge. Three shifts are sending the new 3-compartment shaft down 10 ft. per day. It is now down about 150 ft. and will be carried to 1,000 ft. A station will be cut at 520 ft. and extensive crosscutting done.

The total production of the Goldfield camp for the week ending Aug. 22 is reported as 2,941 tons having an estimated average value of \$231,320.

The recently-incorporated Florence C. O. D. Mining & Leasing Co., owning the Granite and Figaro No. 2 claims in the Goldfield district has taken over the old Waverly lease on blocks four and five of the C. O. D. Co. The lease is equipped with a hoisting plant and other machinery and has a 300-ft. working shaft. There are three known veins on the property, which will be intersected by crosscuts to be run at once.

Work on the 150-ft. drift on the Baby Florence lease is being pushed by Superintendent Meikel. The 400 level is expected to encounter the lens at any time. A winze is being sunk in high-grade ore from the 150 level and if it continues with depth an upraise will be made from the 400 level to develop the ore body.

#### Manhattan.

Two shafts are being sunk by Milo Plamenaz, who is operating lease No. 1 on the Union No. 2 claim on Litigation hill. Shaft No. 1 is down 60 ft. and shows 3 ft. of ore, averaging \$40 to the ton. Shaft No. 2, sunk on a junction of two veins, is down 55 ft. One of the veins is 3 ft. wide and averages \$12 to the ton and the other, 2½ ft. wide, averages \$30. The ore taken out is being held on the dump for milling at the Veith-Plamenaz mill.

Lease No. 2 is owned by Brygger and associates. On it a vertical shaft is being sunk to tap the Plamenaz ledge opened on lease No. 1. The shaft is down 30 ft. and it is expected that the vein will be reached in from 18 to 20 ft.

Lease No. 3 is owned by Macnamara, Stevenson and Train. A vertical shaft, now down 22 ft., shows 3 ft. of ore at the bottom that is said to average \$70 to the ton. A 5 or 6-in. streak of much richer ore is being sacked from along the hanging wall.

The shaft being sunk on the new ledge on the Manhattan Cons. Mines Co. is down 25 ft., from which point a crosscut has been run 20 ft. Good showings are reported by Superintendent Thomas. From 60 to 75 tons of \$30 to \$32 ore has been taken out and is being shipped to the Peterson mill for treatment. A ledge 16 ft. wide has been opened up.

A 6-in. lead, which panned free gold, was recently uncovered on the Morning

Star claim. The find was the result of a search for the source of some rich float found on this ground. The property is owned by Griffin, Martinson and Durgin.

The Manhattan Milling Co., which recently took over the Lemon mill, recently resumed operations after putting the mill into first-class shape. A run is being made on 150 tons of ore from the Shea lease on the Union No. 9 property. Dan Fessenden is superintendent of the mill.

#### Blair.

The property of the Goldfield Silver Peak Mining Co., a Los Angeles corporation, is located within 3½ miles of the Pittsburg Silver Peak mine, near this point. The main shaft, sunk upon what is known as the Prindle vein, has reached a depth of 226 ft. and is equipped with a 25-hp. hoist compressor and Ingersoll-Sargent drill. At the 200 level a crosscut was run to strike the Plymouth Rock vein, which was picked up at 325 ft., and shows 8 ft. of free-milling ore running up to \$14 to the ton in values. Sixty feet from the shaft a blind vein was cut with values running from \$4 to \$14 across 4 ft. Work has been discontinued because of the excessive heat. Before the winter season sets in the company contemplates the erection of a 10-stamp mill.

#### Beatty.

In the Mayflower section the milling plant of the Pioneer Leasing & Milling Co. is now in commission. The mill has a capacity of 45 tons per day. The ore body of the company's property is developed to a depth of 110 ft. and a shoot of ore assaying \$85 has been uncovered which assures success of the mill.

The Biddlecome and Culver lease on the Diamond Queen shipped last week its fifth car of ore. Production continues and ore is being sacked for another shipment from the north drift and from the winze in the south drift.

A test shipment to Los Angeles of 100 tons of ore from the Taylor returned values from \$20 to \$80 to the ton. Drifting on the vein continues on the 150 level.

Superintendent Newcomer is rushing work on the building of the new reduction mill at Springdale, which will be ready to run about Sept. 15.

The shaft on the General Bullfrog on Gold gulch has reached a depth of 70 ft. and sinking will continue to 100 ft., when drifts will be run.

The shipment from Jack Loslard's lease on Ladd mountain to the Shoshone mill amounted to 12½ tons and gave returns of \$83.29 to the ton on 9 tons and \$19.61 to the ton on the remainder.

Lenile & Dawson have uncovered a small shoot of \$40 ore on the surface of their lease on the Diamond Queen, and have decided to begin a new shaft if the crosscut from the old shaft fails to enter promising ground in a few days.

The winze on the Easter Sunday lease is 20 ft. in ore, and a carload shipment will be made in about 10 days. The ore averages around \$75 and the size of the body is not known.

#### MISCELLANEOUS CAMPS.

**Fallen.**—The town of Hazen was almost totally destroyed by fire Aug. 23, the

Southern Pacific depot, freight house and coal sheds being the only buildings left.

**National.**—J. L. Workman has recently sold his Charleston group of claims in this camp to S. W. Gundaker and associates of Goldfield. The first payment has not been made public. Preparations are being made for extensive development. It is planned to drive a 1,500-ft. tunnel on the ledge into Charleston hill. Frank Brown will have charge of the work.

**Rosetud.**—George Wilson, L. F. Vail, Roy Bullen and C. F. Tom, leasers on the Dreamland, have recently made a shipment of rich ore to Salt Lake.

**Jack Rabbit.**—The new power and hoisting plant at the Onondaga shaft of the Nevada-Utah Mining & Smelting Corporation at this place is in place. The equipment, which was installed by Superintendent Wickes and Master Mechanic Samuel Whitney, consists of two sets of boilers aggregating 140 hp., two air compressors and a 100-hp. hoisting engine. The shaft, now down 450 ft., will be deepened and a drift started to connect with the 900 level of the Day mine, where a drift has been started to meet that from the Onondaga.

**Lida District.**—John Franks has leased the Buster mine of the Lida Queen Mining Co. and will start up the mill Sept. 1. The Lida Queen Co.'s mill is at Pigeon Springs, 5 miles from the mine, and consists of 10 stamps with plates, Wilfley tables and Frue vaners.

**Roughside.**—A 2-in. streak of rich tellurium ore has been discovered on the St. Ives lease. The streak, which was discovered on the surface, has been traced from 70 to 80 ft. A crosscut is being run from the 200 level and is expected to reach the vein in another 100 ft. or less.

**Carson City.**—Some very rich free-gold ore is being taken from the Duncan-Jackson lease in the Delaware district.

## OREGON.

Grant's Pass.

Forest fires have been raging in the timbered section of the southern Oregon mining districts for the past three weeks and considerable damage has been done, not only in the loss of timber, but of buildings, cabins, etc. The fire at one time completely surrounded Grant's Pass, and it was only by great effort that mining property near the town was saved. Several mining claims in the Jones creek district were burned over and the cabins destroyed.

The Portland owners of the Mountain Treasure mine, of Jump-Off-Joe district are installing a steam power plant and compressor on their quartz property. This claim has been under development for the past two years. The ledge has been opened to a depth of 200 ft. and presents a width of from 4 to 6 ft., with gold values. Several very rich strikes were made on this property during the past two months. The owners of this claim are also the owners and managers of the Mount Pitt mine adjoining which has

been producing for the past four years. Both properties are being developed and improved. A contract has just been let for the driving of a 350-ft. tunnel on the Mountain Treasure. One hundred feet of this will be on the ledge. This camp gives promise of most important development.

The Bohemia district, which has been quiet for over three years, is now a scene of considerable activity. Lack of funds caused development work to be suspended on many properties two and three years ago, but money has been obtained so that many of these will be able to complete the work originally planned. Several claims and mines were reopened this past month and a number of good strikes have been made. One of these was on the Sampson claim, a well-defined 5-foot ledge of rich copper and gold-bearing quartz being uncovered. Assays show values of \$77 to the ton. The claim is the property of Dr. W. W. Oglesby and J. W. Gowdy of Cottage Grove, and Frank Talkington, of Salem.

The owners of the Hardacre property have uncovered a body of rich ore. Herbert Leigh, manager of this property, has a crew at work developing the mine and building better roads to the camp from the main highway.

The owners of the Mayflower mine, on which a good strike was recently made, are constructing a good road to the mine. The Mayflower people are getting ready to install a reduction plant and are constructing a big flume and electric power plant.

A new mining district is being opened up in Marion county on Gold creek. The county court of Marion has appropriated \$2,500 for the building of a good highway to Gold creek. This sum will cover the cost of five bridges across the Santiam river. The Gold Creek claims, owned by both eastern and western people, have been under development for the past three or four years and are proving of exceptional worth. In order to push development with the best possible speed, the water of the Santiam will be considered and a large power plant erected. As the ore is base in character and is a good smelting product, a large smelter will be built in the camp, as well as a tramway for transporting the ore from the mines to the plant. Deep crosscut tunnels are now being driven, and an immense body of ore uncovered. The ores of the Gold Creek district is gold, silver and copper with average values from \$20 to \$30 to the ton. There are some 20 claims in the Gold Creek group, all located on the Little North Fork of the Santiam river. The headquarters of the company are at Salem. Sam Burghart is manager.

## SOUTH DAKOTA.

Deadwood.

At the annual meeting of the stockholders of the Gold Eagle Mining Co., the following directors were chosen: John S. Sheppard, G. M. Luttrell, A. M. Masters, all of Jacksonville, Ill.; also Dr. T. M. Scott of Petersburg, Ill., and Joseph Keller of Maitland. Mr. Masters was chosen president, treasurer and general manager. Mr. Sheppard, vice-pres-

ident and Mr. Luttrell, secretary. The company's property, in the Maitland district, is in good shape and considerable development work has been ordered to be commenced at once.

A discovery that promises to prove of the greatest importance in Black Hills mining has just been given a number of successful tests by Dr. H. H. Muggley of this city. Dr. Muggley's company has found an alkaline solution which disintegrates both hard and soft ores after an application of but two or three minutes. The ore is first given a mild roasting for the same length of time and after being dipped in the solution put on the rolls which pulverizes almost any rock. Roasting machines have now been ordered by some of the mining companies here each machine to have a capacity of 100 tons of ore in 10 hours. This new process simplifies the reduction of cyaniding ores to such an extent that the later process of treatment by cyanidation is much more readily made. Under the new process of reduction it will require but one-third the time and 50% less cost to reduce any ore in the Black Hills. It is believed by mining men here that this will result in the opening up of scores of small properties owing to the small cost of reduction of ores.

A rich strike is reported of the Montezuma property at Rochford, where a new 2-ft. ledge has just been opened up that carries a high-grade of free-milling gold ore. It is said to be one of the richest ledges thus far encountered in the southern hills and is supposed to have an important bearing on the work in that district.

The Montezuma Extension Co. is also opening up some good ledges and is preparing its property for a period of production.

It was announced at the annual meeting of the Reliance Gold Mining Co. held in this city that the 200-ton cyanide mill that has been in operation for nearly two years, had just begun to pay. The company has been obliged to make some costly experiments and improvements in its treatment from time to time, but last month showed a record run both as to cost and tonnage. The directors elected were as follows: S. E. Olson, Minneapolis, Minn.; C. E. Humphrey, Cordova, Ill.; V. C. Wass, Dell Rapids, S. D.; T. W. Ramer, Little Falls, Wis., and F. W. Medbery, Deadwood. The directors chose for officers: S. E. Olson, president; V. C. Wass, vice-president; F. W. Medbery, secretary, and E. Bennett, Lincoln, Neb., treasurer.

It is announced that there is a possibility of the Alder Creek Mining Co. resuming work on its ground south of here. The company has been idle for several years past, although it is recognized that the ground contains values in ore that, if properly handled, would be profitable. The Alder Creek Co.'s property adjoins the Wasp No. 2 on Yellow creek and both have the same conditions. The Wasp is the only company today that is mining the actual quartzite, the majority of the companies merely taking the ore from off the top of the quartzite formation. The Alder Creek ore bodies show

in open cuts which are easily mined. There is a 10-stamp mill on the property, capable of handling 50 tons of ore per day, but it has been found that, to successfully treat the low-grade ore in that vicinity, a greater capacity is required. It is the plan of President John A. Sandholm and associates to interest sufficient capital to increase the equipment of the treating plant to handle about 200 tons daily.

The Altia Mining Co., formerly the Puritan Mining Co., is continuing its plans for an early resumption of work on the ground in Strawberry gulch and is adding to its acreage by recent purchases. It has just taken over the Whang Doodle ground from Archie Ferguson and when the Kansas City owners complete the financing of the company, the work of sinking the shaft will be renewed and the 200-ton cyanide mill reopened.

## UTAH.

### Salt Lake.

The new Knight smelter at Tintic is at last in operation, the first lead furnace having received its first charge on Friday, Aug. 28. The first bar of lead bullion was cast on Aug. 29. The furnace was blown in on a charge of Colorado ore averaging about 47% lead and everything went smoothly. When completed, the plant will have four lead furnaces and one copper furnace. The second battery of two lead furnaces will be ready in a few weeks, giving a total capacity of 1,000 tons of ore daily. The copper furnace is about ready to go into commission.

About \$350,000 worth of ore is reported to be on the dumps of the Mammoth mine awaiting shipment to the smelters as soon as it shall be called for. All this ore has been taken out since the closing of the smelters last fall.

A discovery of ore is reported to have been made in the winze in the Mountain City mine near Iron canyon. The streak, although small, looks promising. The winze is to be carried another 50 ft. under the present contact.

A contract has been awarded to W. Deebie to drive 100 ft. of additional tunnel on the Park City Mining & Power Co.'s property in Cottonwood canyon, near the Columbus mine. The tunnel is now in 299 ft. In both the tunnel and the 137-ft. shaft on the property some promising indications have been met. W. L. Horwood is at the head of the company.

## WASHINGTON.

### Republic.

The question of providing fuel for the Keller & Indiana Smelting & Development Co.'s smelter at Keller has been settled by an arrangement to open the Columbia river from Wenatchee, on the Great Northern railway, to the mouth of the Sans Poil river, six miles from Keller. A small steamer is being prepared for the transportation of coke. Arrangements were made for the haulage of ore from the Manila mine, and wagons and teams are ready, awaiting only the signing of a contract by the president of the company, to start from Republic to-

ward Keller. The company expects to blow in the first furnace on or about Sept. 1. Several small mines in the San Poil district are depending on the smelter for the sale of ore.

A steamer has been chartered for regular trips up the Columbia river as far as Rickey rapids, and cheap transportation may now be had for ore from Covada and neighboring camps.

The Silver Leaf mine has sent out the first load of silver-lead ore from Covada, by river route, to be transferred to the Great Northern railway at Myers' Falls, consigned to the Everett smelter. The shipment will run over \$100 per ton, market value.

The British Columbia Copper Co. is operating a diamond drill on the Lone Star and Washington mine in this county, to determine the quantity and value of ore which may be mined on a paying basis. Should the results prove satisfactory, the old machinery on the property will be set aside and a new and modern plant will be installed suitable for development to the depth of 1,000 ft.

Richard Mulroy and associates, lessees of the Republic mine, have shipped the third car load of ore and are getting ready to ship another one.

W. M. Crummer and Nels Erickson are steadily operating the Insurgent mine in Republic camp under lease and at present are making good headway on the lower tunnel level of the Lone Pine workings, having the privilege from the Pearl Cons. Mining Co. to continue the Lone Pine drift on the vein into the Insurgent ground. The vein, 12 ft. wide, has lately been penetrated from the hanging wall to the foot wall; thence driven on along the foot wall. Indications of a pay shoot are daily becoming better.

The Lucille Dreyfus mine, near Danville, which was closed down about four years ago, is again in operation and will probably soon become a shipper under the superintendency of Theodore Pettersson. The vein is about 100 ft. wide, as developed in a crosscut tunnel, at a depth of 75 ft. The ore is principally pyrrhotite, with values in copper and gold. A winze has been sunk 125 ft. in the vein from the tunnel level, a horse whim having been used while sinking. This is about to be replaced by a steam hoist, which has been purchased and is already in transit to the mines.

The Knob Hill Mining & Milling Co. is installing machinery. A car load of ore was recently shipped to the Granby smelter, which assayed about \$40 to the ton in gold. The company is now driving a long tunnel to develop the vein at considerable depth and is equipping with a compressor plant, under the management of S. L. Boyer.

G. Weaver Loper, manager of the Colville Mining & Smelting Co. has returned from New York and is preparing for a considerable outlay on the South Half Colville group of claims in Park City camp.

### Orient.

A vein has been encountered in the Second Thought mine at Orient at a depth of 25 ft. and a shaft is being sunk on it. The ore is free milling and iden-

tical with that in the First Thought, and not over 500 ft. distant from the latest strike on that property. The Second Thought is claimed to have 800 ft. of the First Thought vein in adjoining claims.

During July, 31 railway cars of ore were shipped from the First Thought mine, which exceeded the shipments during April, through which month more ore was shipped than at any time previous for a corresponding period. The company has added two new piers to its aerial tramway.

The First Thought Extension Co. has erected good houses for the miners and has started work on its property.

Much encouragement is found in late developments in the Chief and Butte mine.

The Beecher mine is showing up well and ore of high value is reported. The working force has been increased, and the ore is being sorted to be shipped in sacks as soon as they arrive. The returns from the first carload at the smelter are expected to furnish means for considerable development work and machinery that will be needed.

The Copper Butte & Orient mines are at present under the disadvantage of poor ventilation and foul air. The miners are therefore compelled to work on short shift.

The tunnel on the Trophy mine is now in 385 ft., a contract for the last 100 ft. of the distance having been just completed. The Trophy Mining & Milling Co. recently held a stockholders' meeting at Orient and elected trustees and executive officers as follows: James T. Dolan, president; C. E. Legg, treasurer; R. E. McClintock of Spokane, secretary; H. L. Schermerhorn and H. D. Trunkey of Spokane and A. A. Anderson of Orient are the other trustees.

The Trojan Co. has secured fresh working capital and has placed an order for a gasoline engine, a blower and additional air pipe for the lower tunnel, work in which will be resumed as soon as the machinery and pipe are installed. The company will push the tunnel to completion, being anxious to learn what the 500 level will produce.

A good showing in the Butte and Washington mine has resulted from its exploitation.

## WISCONSIN.

### Linden.

The Ross Bros., with a small force of miners, are cleaning up some highly leached ores taken from below the glass rock, the ore making in new ground. Over 1,000 tons of concentrates has been carried over from last season, awaiting better markets for the lower grades of concentrates.

The Levi Pollard, east of and adjoining, and on the same range as, the Dark Horse, has shipped one car of rough jack. The mine has not yet been fairly developed.

The Jack Stevens mine, now operated by a brother of the original owner, Thomas Stephens, shipped one car of high-grade blende last week.

### Platteville.

Operations at the Klar-Piquette, after

a close down of several months, were resumed this week. Ores will be marketed to local buyers.

The St. Rose continues in steady operation and is making the same strong showing as it did a year ago. One car of ore assayed 56% zinc off of the jigs. The ore went to Charles Snow for the Peru works.

The Empire mine has been turning out 30 tons of concentrates each 8-hour shift, both this and the Acme mines now running on double shift.

The Wisconsin Zinc Co. will increase the power at the Mitchell-Hollow mine by adding another boiler, and will install heavier pumping apparatus. A week's steady pumping with present equipment failed to make any appreciable showing against the flow of water. Drilling operations were satisfactory to the company.

The electrical separating plant, now shut down for alterations, has been handling about 65 tons of concentrates daily, but this amount will be increased considerably after operations have been resumed.

The Weigle Co. will be newly incorporated. The mine is well developed and is equipped with power, mill and mining machinery.

#### Hazel Green.

The Kennedy mine has been equipped with another concentrating plant of 100 tons daily capacity, the Galena Iron Works Co. having had the contract. Three sets of jigs, amounting in all to 21 jigs, rougher sand and cleaner will dress the ore. The mill is operated by an independent power plant. The company is sinking an old shaft about 30 ft. deeper to insure a strong flow of water for reservoir supply. The Kennedy is the only mine in the district carrying two concentrating plants, but the Mills, its next door neighbor, has the largest milling capacity of any plant in the field, being able to handle 300 tons of raw dirt every 20 hours.

#### Cuba City.

The Board of Trade Mining Co. has a big surface equipment, covering power plant, pumping machinery and 100-ton concentrator. The mine is west of the Reliable and about 1½ miles north of Cuba City.

Three cars of ore assaying better than 50% zinc were shipped last week from the Baxter. There is still several hundred tons of ore on hand, which is being held for better prices. Superintendent Perkins, formerly of the Tripoli at Mineral Point, is in charge.

#### Highland.

Recent shipments from this camp consisted of five cars of carbonate concentrates, two each going from the Franklin and Highland Mining Co.'s and one from the Minter from ore in storage.

A roadway is being constructed from the Wallace mine to the St. Anthony mill, which, as soon as completed, will enable the Wallace people to treat their ore at the St. Anthony mill.

Some of the biggest strikes ever made in the camp were made recently on the Franklin, where the ore deposit

shows a facing 14 ft. in height and over 100 ft. wide. This strike is on the Leuke tract and makes in new ground.

Three big strikes of the same class of ore have been made on the Carey land adjoining.

#### Benton.

A strike of dry bone of considerable proportions is reported from the Alderson lease, which is north of and adjoins the Corr mine. At 81 ft. and again at 90 ft. a pitch of ore was cut in the shaft, the lower run showing strong in black jack.

The Dawson is being operated steadily. The repairs on mill equipment made recently enable the company to maintain a considerable output ready for market.

### WYOMING.

#### Cheyenne.

A campaign of extensive development is under way on the Rambler mine in the Lake Creek camp and a good force of men is employed.

A rich body of ore was recently encountered while sinking in the Pollyton shaft at Lake Creek.

A contract has been let for the grading of 10 additional miles of roadbed for the Laramie, Hahn's Peak railroad. This addition will carry this road deeper into the Lake Creek mining region.

It is expected that the Independence mine and mill will soon be in operation and the new smelter blown in.

What is reported to be a important strike of a rich streak of ore has just been made on the property of the Utopia Mining & Milling Co. in the Centennial district. The ore is a fine grained gold-bearing iron sulphide. The vein is about 5 ft. in width and mostly ore, but of lower grade than the rich streak. The ore will be sacked and shipped for treatment. Bernard Holtum is manager.

The American Gold Placer Mining Co. is testing its new plant of machinery at its property on Douglas creek in southern Albany county. The plants include a large steam shovel.

### CANADA.

#### ONTARIO.

#### Ontario.

Shipments for the weeks ending Aug. 15 and 22 were 711 tons and 504 tons respectively and for the year to Aug. 22 were 13,276 tons. The shipments were as follows:

	Week Aug. 15.	Week Aug. 22.	Year. 1908.
	Lbs.	Lbs.	Lbs.
Buffalo	.....	.....	752,660
City of Cobalt	.....	.....	225,119
Collins	.....	.....	284,159
Collins Central	.....	.....	272,990
Cobalt Lake	.....	.....	342,568
Cobalt Townships	.....	.....	165,320
Crown Reserve	.....	.....	195,681
Drummond	.....	.....	674,094
Foster	.....	.....	178,100
King Edward	.....	.....	612,244
(Watts)	.....	.....	602,769
La Bore	.....	.....	5,083,690
Little Nipissing	.....	.....	81,747
McKinley-Darrach	.....	.....	2,153,000
Nylon Helen	.....	.....	3,356,917
Nipissing	.....	.....	3,356,917
Nova Scotia	.....	.....	211,775
O'Brien	.....	.....	4,306,087
President	.....	.....	151,689

	Week Aug. 15.	Week Sep. 23.	Year. 1908.
	Lbs.	Lbs.	Lbs.
Flight of Way	.....	.....	722,890
Silver Cliff	.....	.....	55,000
Silver Leaf	.....	.....	258,710
Silver Queen	.....	.....	1,132,870
Tremblant	.....	.....	638,640
T. & T. B.	.....	.....	822,420
Trotterway	.....	.....	179,610

The underground development at the Silver Leaf mine has assumed large proportions recently. When the work under way by Mr. Symmes, lessee of the property, is finished considerable more will be known about underground values. Diamond drill explorations are to be begun shortly and will cover several localities. No. 5 shaft has reached a depth of 195 ft. and the ore at the bottom is richer than at the upper level. A cross-cut is being driven on the 135 level from the drift 200 ft. west of the shaft south-west toward the contact. An 8-in. vein, assaying in silver, was cut by this cross-cut on which drifting will be done as the contact has been reached.

The discovery of a new vein carrying native silver and smallite is announced from the claim of Chaston and Steindler at Silver Lake in the Montreal River district.

A contract has been let for 200 ft. of core drilling by the Crown Mining Co. in the northern part of Lorrain township. Work is to be begun at once.

### BRITISH COLUMBIA.

#### Rosland.

Development work on the Le Roy mine is being continued at several points with satisfactory results. A new and promising ore shoot is being opened on the 1,650 level. A good shoot of ore of pay grade has been located on the 12th level, but its extent and value have not yet been determined.

A shipment of a carload of ore from the St. Elmo mine by the lessees, Peter Johnson and John Selta, was recently made to the Cons. Co.'s smelter at Trail.

### MEXICO.

#### Guadaluajara.

During the month of July the extraction secured at the big reduction plant of the Amparo Mining Co. of Philadelphia in the Etzatan district of this state was 93.5% of all values. In the month of June the extraction amounted to 82.96%. In July the ore crushed amounted to 3,180 tons, and in June to 3,205 tons. William Howard, formerly at the Esperanza mine in the El Oro district, is now in charge of the Amparo reduction work. The ore hoisted from the Amparo mines in July reached 3,005 tons, exceeding the June record by 11 tons. For every ton of ore hoisted another ton was broken and left in the stopes as reserve. In addition, at the upper terminal of the aerial tramway connecting the mines and 40-stamp mill, there is an ore reserve of more than 6,000 tons. This represents almost a two-month's run for the mill, and in this way any accident to mine machinery that would prevent hoisting is guarded against so far as the milling of ore is concerned. C. W. Lininger has been appointed mine superintendent for the Amparo company, taking the place made vacant by the promotion of J. H.

Howard to the position of general manager.

Because of delay in turning over the old Bolafios district of this state to the Bolafios Mining Co. of St. Louis, as the result of legal technicalities, the Supreme court of Mexico has issued a peremptory order for the immediate transfer of the mines to the American company.

M. J. Slattery, general manager of the Philadelphia Copper & Gold-Mining, Milling & Smelting Co., owning the San Vicente mines in the Ameca district of this state, has left here for Philadelphia. While there he expects to secure from the directors of the company the necessary authorization for the erection of a 10-stamp mill and concentrating plant at the mines. Mr. Slattery hopes to be able to start work on the mill foundations immediately after the close of the present rainy season. The development of the San Vicente mines has been in progress several years. It is stated that the proposed new plant will be preliminary to a smelter.

George Sands of New York, a representative of the Admiration Mining Co. of New York, is now in the Hostotipaquillo district of this state. The company was recently organized to take over and develop the Old Doe, Admiration and Josefina mines, in which J. G. and David H. Sands of Hostotipaquillo are largely interested. It is stated that some money is now available for development work.

#### Chihuahua.

The San Toy Mining Co., operating in the Santa Eulalia camp, is shipping daily about 150 tons of lead-silver ore to the Cia. Metalurgica de Torreón at Torreón. The ore runs from 30 to 40 ozs. silver and from 15 to 25% lead. It is the plan to soon considerably increase this output. Experiments are in progress for the commercial treatment on the ground of an immense tonnage of mined and available ore running about 10 ozs. silver and 2% lead. Donald C. Gillies is manager.

The production of the Parral camp for the week ending August 15 was over 8,400 tons, of which over 5,000 tons were treated at local mills and the balance sent to outside smelters. This is a small increase over the output of the preceding week.

The Mexican Midland Mining Co. is carrying on encouraging development operations in the Choreros, Naica and Parral camps of this state. At Naica ore of shipping grade has lately been encountered. To facilitate operations at the Choreros properties a 25-mile railroad is under construction from a point on the Orient railway east of Chihuahua. D. M. Evans is general manager.

The Sahuayana Mining Co., of which Geo. E. Howard is manager, is to carry on more extensive work at its property in the Ocampo district. It is the plan to put the mill in early commission. This is a Pittsburg, Pa., company, in which are interested P. A. Sloaner and C. W. Smith, both of whom lately inspected the property in company with the manager.

The Banco Minero at Chihuahua reports the following recent bullion receipts: Lluvia de Oro, four bars gold-silver, valued at 6,000 pesos; Batopilas Min-

ing Co., 89 bars silver, valued at 98,500 pesos; Watterson Gold Mining Co., 11 bars gold-silver, valued at 28,500 pesos.

The San Martin Mining Co., of which J. J. Watterson is general manager and largest owner, has made a successful trial run of its remodeled milling plant and is now building a roaster for the treatment of concentrates before their delivery to the reverberatory plant. A rich ore discovery was recently made in the mine and some high-grade ore is now being extracted.

The affairs of the Greene Gold-Silver Co. are still in a tangle, although a late report is to the effect that the earlier-mentioned reorganization will be effected on the return of Colonel W. C. Greene from Japan. The majority of the labor liens against this company, as well as those against the Sierra Madre Land & Lumber Co., an affiliated concern with lumber lands in western Chihuahua and large saw mill at Madera, have been settled during the past 30 days, and the situation at Ocampo and Madera is somewhat relieved, but both companies are still very much involved financially. It is said that control in the Sierra Madre Co. has passed into the hands of stockholders who are financially able and willing to go ahead with the enterprise.

The American Smelting & Refining Co. is sending to the El Paso smelter from its Santa Eulalia and other mines in this state (including some tonnage of custom ores) about 3,000 tons of ore per month. At the same time the new Chihuahua plant is handling about 300 tons daily. Work on the aerial tramways at Santa Eulalia is also under way, the work being under contract to the Trenton Iron Co. of Trenton, N. J.

The Hinds Cons. Co. recently suspended milling operations at its property in the Santa Barbara district and it is likely that mining operations have ceased at this writing. The condition of the metal market and the difficulties attendant on the selling of the product are explanatory of this course.

W. A. Pomeroy has succeeded Robert W. Bissell in the management of the affairs of the Lustre Mining & Smelting Co., whose properties at Santa Maria del Oro in the state of Durango are best reached from the Rosario terminal of the Parral branch of the Mexican Central railway. The company operates a semi-pyritic smelter.

The American Smelters Securities Co. is said to be now profitably operating the famous Tecolotes mine in the Santa Barbara camp. The remodeled milling plant is handling over 600 tons of ore daily and turning out about 100 tons of concentrates, while the crude product from the mine amounts to over 50 tons daily. The present working force numbers about 500 Mexicans. There is a report that the erection of a zinc plant is under consideration. W. Maynard Drury is the manager in charge.

#### Cananea.

George A. Eastman is in Los Angeles purchasing machinery and equipment for the El Aguaje, a property that he and his associates have recently acquired from Alex. Alexander of Douglas, Ariz. The

property is an antiqua. An excessive flow of water has kept former owners from doing the development work that the character of the mine warrants. Mr. Eastman has unwatered one shaft and encountered a 6-in. vein carrying good values in silver and copper. A shaft has been sunk a short distance from the unwatered one and a similar result realized.

Mally Eastman of Beaumont, Texas, has returned to his mine about 80 miles south of Nogales, after an absence of over a year. His claims show well in gold and silver and with the necessary capital, which he has obtained no further delays are looked for and the long tunnel which has been partly driven, should reach the ore vein by the first of the year.

The Minas Pedrazzini Gold & Silver Mining Co. of San Francisco, Cal., is considering the matter of installing a 4-mile tramway to its mine in Sonora. Edward L. Dufourcq is general manager at the company's New York office.

B. W. Turner, of Goldfield, Nev., accompanied by Jay Augustine, has gone to the Belen Mining camp to make an exhaustive examination of the mines of that company.

The Alamos Mines Corporation has recently been organized to mine and develop gold-bearing claims which that company holds in the Alamos district of this state. The denunciations cover two promising properties, one a placer proposition, the other a cobalt-nickel. The placer property is known as the Vaughn and lies about 35 miles southeast of the town of Alamos. It embraces 30 pertenencias that contain about 900,000 cu. yds. of gravel that will wash approximately \$4 to the cubic yard, according to careful tests that have been made. The auriferous gravel averages 8 ft. in depth. Large tracts adjoining have been denounced, but the titles have not yet been received. The quartz property of the company is situated about 30 miles northwest of Alamos. It is a more promising holding than the Vaughn. The samples taken from it show 9% nickel, 10% cobalt and high averages in arsenic. Active work of extracts and shipments of this ore is expected to begin by October 1. The officers of the company are: James Gillilan, president; Jas. G. Delaney, vice-president; J. B. Sperry, treasurer; E. R. Marshall, secretary. Geo. M. Bloomer is general manager. It is the intention of the company to ship all their ores to the reduction plant at Fundicion for treatment.

The Estrella Mining & Smelting Co. has undergone a complete reorganization and has taken up the option on the Los Janos mine, which on account of the dissension of those in control of the property, was allowed to lapse. Work has commenced at the mine, with ample funds for continuance. All operations and business will be carried on under the Mexican corporation, the La Compania Minera de Estrella, which owns the mines of the company. The new officers are: Allen T. Bird, president and treasurer; A. Heaventon, vice-president; Frank H. Howard, secretary. Titles for the Guerrero mine were turned over to the company last week.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to *The Mining World* who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The American Mines Investment Co. of Colorado has opened offices in the new Idaho building in Denver.

The annual meeting of the stockholders of Boston & Texas Copper Co. will be held in Boston on Sept. 9.

Edward E. Britton, president of the Homestake South Extension Mining Co., of Deadwood, S. D., advises that offices have been established at 100 Broadway, New York.

Since Samuel Newhouse gave the Salt Lake Mining Exchange the site for its new building on Cactus avenue, Salt Lake City, a seat has sold at \$2,500, which is \$500 higher than the last price paid.

A \$30,000,000 corporation is planned by L. Hirsch & Co. and others of London to consolidate the Hualaba-Elliott and other copper properties in Alaska. It is believed that the reporting engineers will complete their work some time next year.

The Hollis Mining Co., with property at Ely, White Pine county, Nev., has opened offices at 171 Broadway, New York. The officers are: President and general manager, W. A. Douglas; vice-president, Samuel Marshall; secretary and treasurer, E. L. Hollis.

The Golconda mine, in Baker City, Oregon, has been sold at sheriff's sale for claims amounting to \$20,000, held by hardware firms and supply houses. Four years ago a Milwaukee firm made a stock selling scheme of the Golconda. It has never earned any money since.

The Kansas-Cananea Copper Co., with headquarters in Chicago and a capitalization of \$10,000,000, has been organized as a consolidation of the Ortega Mining Co. (also known as the Southwestern Mining Co.) and the Red Cloud Copper Co. (or Consolidated Gold-Copper Co.).

The Alvarado mines of Parral, Mex., have been transferred from a syndicate which secured a lease upon a 55% interest in the Palmillo mines from Pedro Alvarado for \$500,000 to the Alvarado Consolidated Mines Co., capitalized under Maine laws for 1,000,000 shares, par value \$10.

The entire issue of \$500,000 bonds by the Arizona Commercial Copper Co. has been subscribed for, or practically so, and the underwriters will get less than \$10,000 bonds, representing the options of scattered small stockholders who have failed to subscribe or dispose of their rights. This will enable the company to proceed under favorable conditions.

Lewis & Severance, of Los Angeles, Cal., are the general agents for the Calumet & Nevada Cons. Mines Co., incorporated this year with a capitalization of \$2,000,000 in \$1 shares. This organization is a consolidation of the Goldfield Tunnel & Mining Co. and the Lida-Wisconsin Extension Mining Co., located in the Lida district, about 28 miles south of Goldfield.

Nev. The officers and directors are William H. Lewis (president), Cassell Severance (secretary and treasurer), Augustus B. Omwake, Frank C. Severance, and D. C. Casselman.

The Mexico Consolidated Co. of Boston has borrowed \$50,000 for four months at 6% and has given to the lenders an option for the same period upon 10,000 shares of treasury stock at \$5 per share. The company has a floating debt of about \$100,000, which was accumulated because of the delay in getting the cyanide mill in operation and in the purchase of custom ores.

J. D. Gerahty & Co., 43 Exchange place, New York, are promoting the Aetna Mining Co., capitalized at \$1,000,000 in \$1 shares, and with property at Needleton, La Plata county, Colo. The officers and directors are: Henry B. Marshall (president), John Maher (vice-president), Walter S. MacGregor (secretary), Augustus Knapp (treasurer), Burt L. Syms, Howard J. Corwin, and Willet G. Adams.

Another suit has been brought by the Little Florence Mining Co. against the Florence-Goldfield Mining Co. The plaintiff avers that on the first of the present year it had 125 tons of ore on its property, worth \$6,750, but that between that time and April 15 the Florence-Goldfield people wrongfully converted this ore to their own uses and purposes. The suit asks for \$13,516, or double the value of the ore said to have been illegally appropriated.

Hayden, Stone & Co. have secured \$150,000 of the 6% convertible bonds of the Ray Cons. Copper Co., dated July 1, 1907, and payable in 15 years, convertible into stock at par, \$10 a share. They have an option until July 1, 1909, upon \$1,800,000 additional bonds of the same issue, being the balance of a total authorized issue of \$3,000,000. The company has outstanding 290,100 shares of stock of an authorized issue of 600,000 shares. The Ray mines are at Kelvin, Ariz. Control of the properties was acquired about 1½ years ago by Utah Copper Co. interests from English capitalists, since which time development under S. W. Mudd has brought into sight about 3,000,000 tons of 24% ore.

The Davis-Daly Estates Copper Co. directors have called a special meeting of the stockholders for Sept. 5, to be held in Portland, Maine. The meeting is to act on the plan of reorganization which has been given heretofore. The principal feature is that the stockholders will have the right to exchange their stock share for share on the payment of \$2 per share, in four installments, the first on Oct. 1 next, the second on Dec. 1, the third on Feb. 15, 1909, and the fourth on Mar. 15, 1909. The 600,000 shares to be issued have been underwritten without any commission. The plan will leave the new

company with about \$600,000 of working capital after all debts of the old company have been paid and all payments on the properties have been met.

## Official Reports.

### DAVIS-DALY ESTATES COPPER CO.

During the period from July, 1906, to June 30, 1908, the company expended \$487,228 for development purposes, \$143,947 for equipment and \$60,032 in the acquisition of new properties. Of this amount \$30,766 was raised by the sale of 20,725 shares of the treasury stock. The management, legal expenses and office salaries at Butte during this period were \$32,074. The expenses of the Boston office, including directors' fees, secretary's salary, office rent and payment of transfer agents, were \$19,124, for a period of 24 months—less than \$800 a month. The work in the mines consisted of sinking 1,608 ft. of shafts, driving 7,716 ft. of drifts and repairing 1,070 ft. of old shafts. The following is the balance sheet as of June 30, 1908:

Assets—Mines, mining claims and land, \$10,108,058; stocks, discounts and commissions, \$251,072; development, \$109,745; equipment, \$143,946; suspense, car service charges, \$672; accounts receivable, \$19,796; cash on hand and in banks, \$8,596; total, \$11,001,885.

Liabilities were: Capital stock, \$8,931,540; surplus, \$1,990,000; notes payable per books \$16,286; deduct receivables \$14,186 (balance \$2,400); accounts payable—New York, \$16,945; Butte, \$54,536; labor Butte, \$5,208; Towle & Fitzgerald, Boston, \$1,196; total, \$11,001,885.

### TRANSVAAL GOLD MINES ESTATES.

The report of the Transvaal Gold Mines Estates for the quarter ended June 30, 1908, shows: The working expenditure and revenue account shows expenditure £43,133 6s 6d, or 28s 10.475d, per ton milled; revenue, £82,034 2s 9d, or 54s 10.952d, and working profit, £39,742 17s 4d, or 26s 7.241d per ton milled. The total profit for the quarter was £37,878 14s 4d. No allowance has been made in the above figures for the amount due to the Transvaal government for tax on profits. On June 30 the company had 620,547 fine ozs. of gold in reserve. The capital expenditure for the quarter has amounted to £2,992 11s 8d. The output for the quarter shows an increase of £10,223 10s 5d, and the profit an increase of £6,885 14s 1d. Working costs show a slight increase. This is due to all expenses at Theta and New Peach Tree mines being charged direct to working expenses instead of to prospecting account, which was only taken into consideration at the end of the year.

The distribution of gold in the parent rock is of first importance to the placer mining industry; for it determines not only the occurrence of auriferous gravels, but also the possibility of lode mining in Alaska.

Some of the ancient river channels of California have yielded \$2,000,000 to \$3,000,000 per mile in gold.

# Latest Ore and Metal Market Reports and Prices

**Silver.**—Evidently speculators are determined to keep prices down, and the absence of buying by India makes the market depressive.

The receipts of silver in London for the week of Aug. 20 were £169,000 from New York and £15,000 from New Zealand; total, £184,000. Exports were £220,000 to Bombay and £2,500 to Colombo; total, £222,500. According to Messrs. Pixley & Abell the shipments from London to the East from Jan. 1 to Aug. 20 were:

	1907.	1908.	Change.
India .....	£7,464,424	£1,163,180	L. £1,151,244
China .....	511,600	1,547,408	1,035,808
Australia .....	508,700	20,511	S. 508,189
Total .....	£8,484,724	£2,731,100	L. £1,151,244

Quotations for silver, per fine ounce at New York and standard ounce (0.925 fine) at London, for the week of Sept. 2, were as below:

	New York.	London.
Aug. 27 .....	71 1/2	70 1/2
" 28 .....	71 1/2	70 1/2
" 29 .....	71 1/2	70 1/2
" 30 .....	71 1/2	70 1/2
Sept. 1 .....	71 1/2	70 1/2
" 2 .....	71 1/2	70 1/2

MONTHLY AVERAGE PRICES OF SILVER.

Month	New York, Fine Oz.				London, Standard Ounce			
	High	Low	Ave.	1907	High	Low	Ave.	1907
Jan.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Feb.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Mar.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Apr.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
May	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
June	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
July	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Aug.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Sept.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Oct.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Nov.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Dec.	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2
Year	84 1/2	81 1/2	83 1/2	82 1/2	71 1/2	68 1/2	70 1/2	71 1/2

Difference in domestic and foreign prices is explained by the fact that the New York quotations are per fine ounce; the London per standard ounce (0.925 fine).

**Foreign Coins and Sterling Exchange.**—Quotations in New York Sept. 2, were:

	1908.	1907.
Sterling exchange .....	84 1/2	84 1/2
German dollars .....	4 1/2	4 1/2
Chinese silver and paper .....	34 1/2	34 1/2
France, 20 francs .....	4 1/2	4 1/2
Germany, 20 marks .....	4 1/2	4 1/2
Spain, 20 pesetas .....	4 1/2	4 1/2

**Copper.**—Prices have shown an interesting fluctuation during the past week, apparently to influence buying by consumers who have been holding off for some time. Wire manufacturers report business better, a fact that gives hope to copper producers.

Exports from north Atlantic ports from Aug. 1 to 31 were 25,905 tons of fine copper. Imports from Aug. 1 to 31 were 5,615 tons of refined copper, 550 tons of matte, and 32,514 tons of ores.

The visible supply of copper in England and France on Aug. 15 was 44,785 tons, as against 42,134 tons on July 31.

Quotations for copper per pound at New York and for long ton (2,240 lbs.) at London for the week of Sept. 2, were:

	Lake.	Star.	Star.	London.
Aug. 27 .....	17 1/2	17 1/2	17 1/2	60 1/2
" 28 .....	17 1/2	17 1/2	17 1/2	60 1/2
" 29 .....	17 1/2	17 1/2	17 1/2	60 1/2
" 30 .....	17 1/2	17 1/2	17 1/2	60 1/2
Sept. 1 .....	17 1/2	17 1/2	17 1/2	60 1/2
" 2 .....	17 1/2	17 1/2	17 1/2	60 1/2

MONTHLY AVERAGE PRICES OF COPPER.

Month	New York—Lake Copper.				1907			
	High	Low	Average	1908	High	Low	Average	1907
January	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
February	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
March	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
April	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
May	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
June	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
July	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
August	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
September	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
October	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
November	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
December	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
Year	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750

New York—Electrolytic Copper.

Month	1908				1907			
	High	Low	Average	1908	High	Low	Average	1907
January	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
February	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
March	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
April	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
May	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
June	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
July	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
August	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
September	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
October	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
November	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
December	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
Year	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750

Quotations for electrolytic cathodes are 0.126 cent per lb. less than for anodes, indurated and wire bars.

N. Y.—Castings Copper.

Month	1908				1907			
	High	Low	Average	1908	High	Low	Average	1907
January	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
February	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
March	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
April	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
May	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
June	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
July	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
August	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
September	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
October	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
November	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
December	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750
Year	14 1/2	13 1/2	13.900	14.000	14.000	13.500	13.750	13.750

**Tin.**—This market has been unsettled by the anxiety of holders to sell at a discount. Straits shipments in August were 6,055 tons.

Arrivals at north Atlantic ports from Aug. 1 to 31 were 3,302 tons; cargoes floated, 1,330 tons.

Quotations for tin, per pound at New York and per long ton for spot at London for the week of Sept. 2, were:

	New York.	London.
Aug. 27 .....	17 1/2	60 1/2
" 28 .....	17 1/2	60 1/2
" 29 .....	17 1/2	60 1/2
" 30 .....	17 1/2	60 1/2
Sept. 1 .....	17 1/2	60 1/2
" 2 .....	17 1/2	60 1/2

MONTHLY AVERAGE PRICES OF TIN, NEW YORK

Month	1908				1907			
	High	Low	Average	1908	High	Low	Average	1907
Jan.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Feb.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Mar.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Apr.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
May	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
June	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
July	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Aug.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Sept.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Oct.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Nov.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Dec.	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00
Year	28.00	26.00	27.50	28.00	28.00	26.00	27.50	28.00

**Lead.**—Demand is quiet, and prices at New York during the week of Sept. 2 were \$4.55 to \$4.60 per 100 lbs. In London soft Spanish metal brought £133s 9d to £136s 3d per long ton (\$286 to \$289 per 100 lbs.), closing Sept. 2 at £133s 9d per ton (\$286 per 100 lbs.). English lead is worth 2s 6d (61 cents) per ton more than Spanish.

Lead ore sold in the Missouri-Kansas district during the week of Aug. 29 at \$61 per ton for 80% grades. Shipments for the week were 1,681,150 lbs., valued at \$50,946.

MONTHLY AVERAGE PRICES OF LEAD.

Month	New York				London			
	High	Low	Average	1907	High	Low	Average	1907
Jan.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Feb.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Mar.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Apr.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
May	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
June	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
July	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Aug.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Sept.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Oct.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Nov.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Dec.	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80
Year	1.80	1.70	1.75	1.80	1.80	1.70	1.75	1.80

**Spelter.**—So little business is being done that quotations at New York are nominal, and were \$1.65 to \$1.70 per 100 lbs. for the week of Sept. 2. In London good ordinary grades brought £19 2s 6d to £19 7s 6d per long ton (\$4.15 to \$4.20 per 100 lbs.).

Zinc ore sales in the Missouri-Kansas district for the week of Aug. 29 were made at \$39.50 per ton for the higher grades and at \$36 to \$37.50 on the assay basis of 60% zinc. Silicate ores of good grade sold at \$18 to \$22 per ton. Shipments for the week were 11,690,356 lbs., valued at \$202,900.

MONTHLY AVERAGE PRICES OF SPECTER.

Month
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## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise.

(See also Market Reports)

[illegible]









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• Illustrated.

## Position of the Smelter Trust.

Again the rumormonger and press agent of Wall street have gone wrong in their predictions, for we learn officially that at the recent annual meeting of the American Smelting & Refining Co. no change was made in the Guggenheim management. Wall street people however, are commenting on the announcement that the list of stockholders contains no record of Standard Oil buying. The Guggenheims are understood to be registered in their own names as holders of only 570 shares of common stock. Mr. Daniel Guggenheim, the president, is not mentioned on the list of shareholders, except as the holder of one share of preferred and as a trustee for several hundred shares. The largest individual holder is Theodore Freeman, with 20,000 shares, which it is generally believed represent the inside holdings.

That the speculative public should be surprised at the "modesty" of the Standard Oil coterie, which was reported to have sort control of the "smelter trust" and to have purchased thousands of its shares at low prices months ago, is amusing to say the least. Readers of The Mining World may remember the editorial in its columns in February last in which reasonable doubt was expressed as to the Wall street story that Morgan and Rockefeller were grafting the Guggenheim family tree with a view of ousting the seven sons and dictating the policy of the so-called "smelter trust."

Standard Oil interests, we believe today as we did months ago, are not over-anxious to figure prominently on the board of directors of any combination other than their own so long as the Federal government is active in trying to enforce the interstate commerce law. Another reason—one which the better informed readers will agree upon—is that the Standard Oil coterie were tempted to buy Smelters stock when it tumbled in price during the financial stringency last fall, the belief then prevailing being that with the return of normal business relations the stock market would rally sufficiently to reimburse speculators who had previously suffered heavy losses.

At what price acquaintances of Standard Oil unloaded Smelters stock is hard to say. An idea of their profit may be had however, when it is learned that the common shares, which broke from \$174 in 1906 to \$39.50 in November, 1907, were quoted at \$99 on Sept. 1, 1908; while the preferred, which slumped from \$130 to \$83 rose to \$109.25. The difference in the market value of the common shares on Sept. 1 as compared with November,

1907, amounts to \$39.50 per share or \$19,750,000 on the total issue of 500,000; while the difference in preferred is \$26.25 per share or \$13,125,000 on the total issue. In other words, since last November the Smelters total capital stock has appreciated \$32,875,000. The preferred stock yields 7% per \$100 share per annum, and the common is now paying 4% per \$100 share. The total dividends from organization in 1899 to October, 1908, amount to \$44,581,553, in addition to which a substantial sum has been distributed among the employees as their share of the profits.

In the last fiscal year (for April 30, 1908) the "smelter trust's" gross earnings fell to \$9,403,282, which is \$3,846,776 or about 28% less than the previous 12 months. Deducting the charges for repairs and betterments, taxes and general expenses, there remains net earnings for the fiscal year 1908 of \$7,633,287, which compare with \$11,509,669 in 1907, and are the smallest earnings reported since 1903. Nevertheless, \$7,000,000 was paid out in dividends and \$622,000 added to the employees' profit sharing fund during the past year. The surprisingly low surplus of \$11,191 for the year compares with \$2,911,253 for the previous 12 months and is the smallest since the "smelter trust" was born. The probability is that had the company made the usual appropriations for new construction and improvements in 1907-8 there would have been no surplus for the year. President Daniel Guggenheim attributes the smaller earnings and surplus for the past year to the decline in the value of lead, silver and copper, together with no proportionate decrease in expenses. Some weeks ago The Mining World commented editorially on the reduction in office and other expenses that were arranged for by President Guggenheim. How much money will be saved by not re-engaging high-priced engineering talent is not known, but we have reason to believe it will be large.

Unfavorable as have been the past year's earnings, it is noteworthy to mention that the "smelter trust" had a total surplus of \$13,008,219 on April 30. This sum is equivalent to over 13% on the total share capital.

Though the pecuniary position of the American Smelting & Refining Co. has not been very satisfactory during the past fiscal year, it is nevertheless certain that the continued improvement in the metal market will result in larger earnings in future. What the managerial policy of the "smelter trust" will be a year or two hence will depend largely on the initiative of the Guggenheims, Wall street stories to the contrary notwithstanding.

### Fires in New Mining Camps.

Rawhide, which only a few months ago attracted widespread attention as a promising new gold field in Nevada, has been visited by a disastrous fire. This fire occurred about two weeks after the destruction of the town of Hazen, Nev.

According to report, the fire at Rawhide started at 9 o'clock on Sept. 4 in Dr. Gardner's office in the Rawhide Drug Co.'s building. The flames, fanned by a gale, swept rapidly south and east to Balloon avenue and up Rawhide avenue to within 50 yds. of the People's hospital. Two hours after the fire started nearly the whole business section was in ruins, the flames finally being checked south of Balloon avenue.

The volunteer fire department and some 500 miners did their best to stem the progress of the fire, which it is estimated caused a property loss of several hundred thousand dollars. Fortunately no lives were lost, and the people injured by flying debris are gradually recovering.

Disasters as this fire may appear—to those who owned surface property in Rawhide—it is not believed that the mines will suffer, excepting in so far as there may be a shortage of labor while the buildings of the town are being replaced.

New mining camps, like boom towns generally with tinder-like buildings, occupy the peculiar position of being without adequate fire fighting service; hence they must expect heavy property losses in the event of a conflagration. How to check property losses is a question worthy of careful debate, for if the town of a new mining district is destroyed by fire the homeless may suffer from a famine. To be without food is more keenly felt than to be without shelter, and when the supply station of a desert mining camp is wiped out of existence in short order the agony of mind of the people that are effected thereby cannot be expressed in words, but must be experienced. Starvation and thirst in a desert country, though it be fabulously rich in gold, deal to mankind the heaviest blow that Death can give.

In the case of Rawhide fortune has hastened the sympathy and generous financial assistance of neighboring mining camps. Even the San Francisco Mining Exchange upon which Rawhide stocks are called has come forward with a contribution of \$500. To all her friends in need Rawhide owes a debt of gratitude, which we have reason to believe will be repaid as soon as the opportunity offers.

The Rawhide incident recalls a sug-

gestion that has been made to us, namely, the support of a co-operative insurance system for new mining camps. The idea is to organize a local mine operators' insurance company to which storekeepers and other property owners in the district shall also belong. The insured could be assessed so that should a conflagration threaten to destroy the supply station or other buildings in the town a well equipped fire brigade would be ready to check the flames. The fire brigade could be made up of men in minor positions at nearby mines, and the apparatus could be kept in a building away from the danger zone. Preparations should also be made for an adequate water supply to facilitate the work of the firemen.

In locating all new mining towns the first thing to be done after it is learned that the mines will be self-supporting is to provide means of obtaining plenty of water. Where the supply of water is limited it would be advisable to build a large covered tank or reservoir in which water could be kept for extinguishing fires. The water reserved for this purpose need not be replaced as time passes, and the cost of keeping the tank full when the level of the water is lowered by evaporation will be comparatively small. The ultimate saving in property, and perhaps life, in taking this precaution against damage from fire, will, we are sure, more than repay any initial expense that may be incurred in adopting the idea that has been suggested.

The better managed mining companies in the older camps have special reserve funds to cover insurance on property and plant, so why should not the younger districts striving for existence adopt a similar plan?

### Small Gold Dredges.

On different occasions editorial comment has been made on the needs of gold dredges of small capacity, low cost and of an efficiency that will compensate the work of a corporation or individual whose financial resources are necessarily limited.

To solve this problem is not as easy perhaps as the uninitiated may think; neither is it one that should be ventured by a manufacturer whose inexperience will soon swallow his finances and may lead to the condemnation of enterprises that really have merit. Too often also a so-called mechanic will prevent the successful operation of a gold dredge by his foolhardy tampering with the inventor's improvements. But this is a matter, which, though it has an important bearing on the gold dredging industry, had

better be discussed more at length at another time.

In a recent issue of our San Francisco contemporary, the editor in commenting on the tendency toward ponderous construction and huge capacity in gold dredging appliances apparently agrees with us when he says "there seems to be a call for efficiency also at the other end of the scale."

To build mammoth gold dredges with buckets up to 13 cu. ft. and capable of digging 180,000 cu. yds. of hard gravel per month at a total cost of only 3 cents per yd. is to accomplish the dream of the manufacturer whose customers have extensive gravel deposits and a well filled purse—not the man or company with limited dredging land and small finances.

What the majority of owners of dredging ground are looking for is a machine, small, efficient and cheap—a dredge with improvements that eliminate the faulty details of construction of the larger types, and one whose light build will not be a handicap when operating on hard gravel.

For some time past THE MINING WORLD has been encouraging inventors and engineers to design a gold dredge that will embody the above mentioned requirements. One enterprising engineer we believe has succeeded in accomplishing his object, and according to his working drawings has perfected a small gold dredge with a single oscillating dipper bucket capable of handling from 500 to 1,000 cu. yds. of gravel daily from a depth of 25 ft. The dredge is constructed of spiral riveted pipe, asphalted, draws 8 ins. of water; dumps all its material aboard, and is fully equipped with modern gold saving devices. The length of the dredge is 100 ft., its width 26 ft., and it carries 30,000 lbs. of machinery. The cost is low. The designer expects to give the dredge a trial in California.

The question of winning the vast quantities of gold known to exist in places is of great economic importance, whether the result is accomplished by dredging or other means, and the machine or appliance that can do the work cheaply and efficiently will make a fortune for its designer.

In view of the large and constantly growing importation of pyrites into the United States the development of domestic deposits should be stimulated. The importation of pyrites still greatly exceeds the domestic supply, and the value of the imported material, which comes chiefly from Spain, Portugal, Canada, and New foundland, is more than three times that of the domestic production.

# Some Notes From the Cananea Copper Field.

By CHAS. A. DINSMORE.

*Equipment of the surface plants. Reduction in cost of copper production. Resumption of mining. Oil used for furnace and power fuel, effecting a substantial saving.*

*Mexican mine labor. Method of handling ore from mine to furnace.*

was much comment on the fact that at Cananea a good many Mexican miners were employed. The fact that the Mexican miner is considered as good a straight hammer-and-drill man as the American or any other nationality induced the management to employ only Mexican labor.

Since the shut-down at Cananea prac-

tically everything but the concentrator has been changed. Last year the Robins belt conveyor system was partially installed and now it is in use. By the aid of this and the reclaiming machine the handling of the ore is a matter really of little moment, because it is done automatically and there is little danger of a lot of Mexicans failing to show up some morning. The ore serving system covers the entire plant, from the ore bins to the smelting furnace, where, by a system of automatic gates and steel bins and runways, the ore is dumped directly into the furnace, and thus one man may care for two furnaces where by the shoveling method it would take three or four men to care for one.

The conveyor belts taking the ore from

the storage bins through the sampler have a capacity of 3,000 tons a day. The sampler, besides having the customary equipment, has a special and ideal sampler invented by Mr. David Cole, assistant general manager. From here the ore goes on belts to the bedding plant, where are three beds, each of 10,000 tons capacity, each being 50 ft. wide and 450 ft. long. Here the charge is correctly bedded by another belt traveling through a carrier, thus automatically and exactly distributing the ore, fluxes, etc., as desired. Then it is delivered on to another set of belts by the reclaiming machine, and is taken directly to the furnace bins of steel, equipped with automatic apparatus to dump the charge into the furnace as required. In all this no laborers are required; in fact, it takes one man as an

oilier, whereas if the work were done by hand it would take more than 100 men. The coke for the furnaces is wheeled to the furnace doors and shoveled in as needed.

There are eight 400-ton blast furnaces, with four now in commission. The tramway for handling the slags is alongside the furnaces on the feed side, but on the floor below. The converters are among the largest in use anywhere, and are electrically handled. This portion of the plant is still under construction. There are two large traveling cranes which handle the pots, converters, etc., and on every hand is a convenience that was not seen in the old plant. The bullion is poured in the usual way, with a tram beneath for handling the cars with the

Cananea has evolved from a 12-cent copper camp to a 7-center. Much of the change enabling this tremendous economy has been through the smelter; but every other branch of the great operation has seen a weeding and an improving that all spelt profit. The operations for the month of August cannot be taken as an augury, and yet, with half the installation in operation—half as much as formerly, when the property was running full blast—they produced more than 1,000,000 lbs. of copper, practically as much as they did with everything in blast. With this, there is the lessening by more than one-half of the hands employed.

With the full complement of furnaces in blast and the entire forces in the mines, it is practically assured that copper will be produced at Cananea for less than 7



View of Cananea From the Mesa.

cents. True, the fuel change from coal and coke to oil has effected another tremendous economy, and the policy of the Mexican government is shown in this matter better than anything else. It was demonstrated to the officials having this matter in charge that one of the reasons it cost so much to produce marketable copper at Cananea was the tremendous fuel charge, and that if they wished to use oil they could not because of the prohibitory import duty. The Mexican officials agreed to remit the duties on fuel oil for the company for a term of years. Just a day or so afterward the general manager, Dr. Louis T. Ricketts, contracted with the Texas Co. for 1,500,000 blbs. of fuel oil, to be delivered at Cananea during the coming 24 months. There

molds, and each bar is of about 300 lbs. weight.

The reverberatory is being operated by oil. It is possibly the most successful new work ever inaugurated, and the savings are tremendous. One saving that brings a good many hundreds of dollars a day to the company is the reduction of

steam and blower plant includes one Rand engine of 750 hp.; two A-C. engines of 500 hp. each; one blower engine of 300 hp. capacity; three Murray engines, two of 250 hp. and one of 120 hp.; A-C. tandem of 250 hp. each; one Aires engine of 100 hp., and one Allis engine of 100 hp. There are three No. 10 Connorsville

hotels downtown; there is a bowling alley, where the men may pass the time pleasantly, and there are grounds for recreation.

At the concentrating plant they get about 232 tons of concentrates from 700 tons of ore. The concentrator is equipped with five crushers, 10 by 20; five sets of rolls, 16 by 36; eight  $\frac{1}{2}$  screens; eight  $\frac{3}{16}$  screens; eight  $\frac{3}{16}$  screens; 16 elevators; 16 hydraulic classifiers; 72 jigs; 10 Bryan mills, 5 ft.; two Cole's improved Chilean mills, 6 ft.; 108 Wilfley tables; 144 Frue vanners; 16 shaking launders; 10 Cole's drag-belt conveyors.

The ore is delivered to the crushing plant bins by Ingoldsby side-dump cars, there being eight bins, each of 20,000 tons capacity. From these bins the ore is placed onto a 30-in. conveyor belt, fed by an automatic device, and then is delivered to the grizzlies, 48 by 96, in which the bars are placed 1 in. apart. The middlings are delivered to the mill storage bins, and the oversize to the crusher bins. The crushers reduce the ore to pass through a  $\frac{1}{2}$ -in. ring, and then it is delivered by belt carriers to the 16 by 36 rolls, when it goes to the mill bins.

There are two units in the concentrator. In mill No. 1 there is a Murray engine, 16 by 36, tandem compound, 400 hp., non-condensing; a Minneapolis Steel Construction Co. engine, 12 by 24 by 30, cross-compound, of 325 hp. In mill No. 2 there is an Allis-Chalmers 16 by 32 by 36 cross-compound engine of 400 hp. There are six 250-hp. Stirling boilers, one electric generating set of 1,600 kw., and a smaller one of 600 kw.

For the crushing plant there is an Al-



Concentrator, Cananea Cons. Copper Co.

all the fine dust in the reverberatory, it having formerly been sent to the El Paso smelter.

Every device possible for expediting the work and for economy has been installed. The dust and fine concentrates are trammed to a compensating lift which takes it to the feed floor of the reverberatory, and there it is fed in automatically and by gravity. The old style of stirring is in vogue, being considered the best. The slag and bullion vents are where the contents must flow by gravity into the receptacles below. This is an ideal portion of the plant, or will be when completed.

The smelting end of the plant is in direct charge of Chas. F. Shelby. He was at one time with the Old Dominion smelter at Globe, Ariz., where he made many profitable innovations, and it has been the same here at Cananea. Mr. Shelby, Dr. Ricketts and Mr. Cole work hand in hand, and all being expert the result is wonderful. Mr. Shelby has installed here whatever is best of any and every smelting practice with which he has become familiar in any way, and he says that he wants to thank a great many smelter men for ideas in vogue at their particular plants and which are embodied in what one must be prone to call "the Cananea idea."

The power plant is probably by this time fully equipped with oil burning apparatus. It is a complete and first-class plant in every way. There are two McIntosh engines in the electrical department of the main power plant, each of 300 kw.; three Union Iron Works engines, of 100 kw. each; and one Union Iron Works engine of 200 kw. The

blowers with a displacement of 300 cu. ft. per revolution, and three No. 8.

The electric plant is interchangeable, from main plant to mines or concentrator, and vice versa.

The concentrating plant is under super-



Belt Conveyor, Cananea Cons. Copper Co.

intendence of Frank J. Strachan. At this plant there are several ideas that make for better service. The men have a first-class hoarding place, where they get meals equal to those of the best

Al-Chalmers 14 by 26 by 36 tandem compound condensing engine of 325 hp.; for the generating sets a Norberg 18 by 36 by 36 cross-compound of 650 hp. condensing engine, direct connected.

# Identification of Rocks of Commercial Value.

By EVANS W. BUSKETT.

Metallurgical Engineer.

It is not generally known that there are a great many kinds of rocks besides metallic ores that are worth money. The prospector in his search for the precious metals of ten overlooks fortunes in the more common minerals. The United States Geological Survey reports 22 minerals of commercial importance, other than metallic ores, precious stones, coal, and building material. These rocks play an important part in the commerce of the nation and add several millions every year to the wealth of the people.

One of the best known of these minerals is the fireproofing material, asbestos. There is nothing about the appearance of the manufactured asbestos that would lead one to suppose that it is made from mineral substance. Asbestos board has much the appearance of a coarse grained cardboard.

Asbestos is a fibrous mineral, varying from a short, stiff, coarse fiber, to a long, soft hairlike fiber, which is easily separated by the fingers and has much the appearance of flax.

The short fiber is used for the manufacture of wall plaster and pipe coverings. Walls plastered with this material dry quickly and have a smooth glossy surface which is strictly fireproof. The short fiber is also used as a fireproof packing in stoves and ranges to prevent the radiation of heat from the sides. The long fiber is used in the manufacture of asbestos cloth and board.

No chemical tests are necessary to identify asbestos. It may be distinguished by its appearance and its infusibility. It occurs in commercial quantities in Georgia, California and Wyoming, and is generally found associated with soapstone. The best long fiber asbestos is worth from \$275 to \$325 per ton, while the short fiber brings as low as \$25.

The island of Trinidad, off the coast of Venezuela, is the largest producer of asphaltum, and it is for this reason that that country occupies such a prominent place in international affairs.

The asphalt deposit is in the form of a lake filling the crater of an extinct volcano. It is 138 ft. above the sea level and has an area of about 114 acres. As the mineral is removed it is replaced from below at the rate of about 20,000 tons per year. It has a powerful odor, and it is said that the odor may be detected at sea before the island can be seen.

Asphaltum is found in the United States in California, Utah, Colorado, Texas, Oklahoma and Kentucky. It occurs in a number of varieties—elaterite, gilsonite, albertite, etc. All these are of mineral pitch, which is a mixture of hydrocarbons. Asphaltum is brown to black in color and very light, its specific gravity being between 1 and 2. It melts at the temperature of boiling water and when ignited burns with a bright flame, producing much smoke. It is soluble in turpentine, and in this manner asphaltum paints are made. It is also used in the manufacture of Japan varnishes and as

*The occurrence, distinguishing features, properties and industrial value of asbestos, asphaltum, barytes, corundum, emery, feldspar, fluor spar, garnet, gypsum, graphite, diatomaceous earth, mica, iron pyrite, sulphur, etc.*

*Methods usually employed to test minerals.*

a road pavement. It is worth from \$230 to \$25 per ton at New York.

Barite, or heavy spar, commonly called baryta or barytes, is a sulphate of barium. It is found in Missouri, New York, North Carolina, and Virginia. It may be recognized by its weight, being nearly as heavy as lead with which it often occurs. It is distinguished from lead minerals by not yielding a lead button when fused with soda or charcoal. Its color may be brown, red, blue to white. The white is the only valuable variety, as it is largely used in the manufacture of paints and as a filler (make-weight) in paper.

Barytes is prepared for the market by grinding it fine enough to float on water. The best grade water floated barytes is worth from \$17 to \$19 per ton while an off color, second grade, product will bring from \$12.50 to \$16 per ton at New York.

Corundum in the pure crystalline form is the gem, sapphire. In a massive state it is commonly known as emery, and is used in the manufacture of emery wheels, emery paper, emery powder and other abrasives. It varies in color from gray to black. It can be identified by its extreme hardness, being inferior only to the diamond, its infusibility and its insolubility in acids.

Corundum occurs in New York, Massachusetts, North Carolina and Georgia. It is found in gravel beds and in veins or dykes of feldspar. It also is found associated with serpentine. Emery is worth 3½ cents to 5½ cents per lb. at New York, while corundum is worth from 4½ to 10 cents per lb. The value of corundum depends in a great measure on its hardness.

Another and more widely distributed mineral of value is feldspar, which is one of the constituents of granitic rocks and often occurs in veins in them. Feldspars differ in composition, being silicates of aluminum, potassium, etc. Feldspars are easily recognized by one who is at all familiar with them. They have a nearly luster and vary in color from white to brown. They have two planes of cleavage, which are nearly at right angles with each other.

Ground feldspar is used as a glaze for pottery, by the paint makers as a wood filler, and by the soap boilers in the manufacture of scouring soaps, and is

worth from \$8 to \$10 per ton at New York.

Fluorspar (fluorite), is a fluoride of calcium. It is found in granular and crystalline form. It crystallizes in cubes which are generally nearly perfect. In color it is yellow, white, green, red, blue, brown or black, and the intermediate shades. When heated with sulphuric acid it gives off fumes of hydrofluoric acid, which etches glass.

Fluorspar is used as a flux in smelting, and for the manufacture of opalescent glass and hydrofluoric acid, and is worth from \$5 per ton in the rough to \$12.50 per ton ground.

Large deposits of fluor spar are found in Crittenden county, Ky., and at Rosiclair, Ill.

Garnet is a silicate of varying composition and of a hardness a little less than quartz. Pure crystallized garnet is a gem of great value. Commercial garnet may be either massive or crystalline. It is used in the manufacture of garnet paper, an abrasive used in making shoes.

Lump garnet is worth \$35 per ton while the ground product varies from \$45 to \$60 per ton at New York. Garnet is found in Connecticut, New York, Pennsylvania, Georgia, North Carolina, and in the Rocky Mountain states.

Although gypsum occurs in many of the states, our main supply comes from Mexico. Gypsum is calcium sulphate. It crystallizes in prisms, which are white and generally transparent. It is very soft and can be scratched with the finger nail. It is identified by chemical tests, reacting for calcium and sulphur.

Gypsum is employed in the manufacture of plaster of paris, which is used in making statuary, picture frames, wall plaster, etc. It is worth \$4 per ton in the rough, and \$8 ground at New York.

Lead pencils contain no lead but are made from the mineral graphite which is a form of carbon, as are also diamond and coal. Graphite is a soft black mineral. It is not acted upon by acid but burns at a high temperature without flame or smoke, leaving a red ash of iron oxide.

Besides the manufacture of lead pencils, graphite is used in making crucibles, and as a lubricant and a paint. Large quantities are imported from Austria and Ceylon. The domestic graphite is worth from \$45 to \$150 per ton at New York.

Diatomaceous earth, infusorial earth, commonly called tripoli, is an amorphous form of silica from the silicious shells of small sea animals called diatoms. Diatomaceous earth is generally white and very fine-grained. It is soft to the feel, but will scratch glass. It is not acted upon by acids and can be identified only by chemical tests. It is used in the manufacture of scouring soaps, etc., and is worth from \$20 to \$60 per ton at New York.

There are several varieties of mica, all of which crystallize in prismatic forms with a cleavage parallel to the base of the prism. It is for this reason that large sheets of mica are scarce. A mine



containing large sheets of mica is more valuable than a gold mine. This mineral is very easily recognized, being the insignia of commerce. A large part of our supply of mica comes from Canada and India, although it is found in the United States where granitic rocks abound. Like feldspar, it is a constituent of granitic, these rocks being made up of feldspar, mica and quartz.

Mica is used in electrical work as an insulator, sheets 1 in. by 3 ins. are worth 12 cents per lb., and sheets 4 ins. by 6 ins., \$1 per lb. Ground mica is used as a lubricant, etc., and is worth from \$45 to \$75 per ton at New York.

Iron pyrite is one of the more common minerals. It is found in many localities, especially where metallic ores occur. Large deposits of iron pyrite are scarce, and for this reason it is worth money. Iron pyrite crystallizes in cubes and has a brassy yellow color, which has given it the name of "fool's gold." The value of this mineral is regulated by its sulphur content, which can be determined only by chemical analysis. Iron pyrite is worth about 10 cents per unit of sulphur. Thus, iron pyrite containing 50% sulphur would be worth \$5 per ton at New York. It is used in the manufacture of sulphuric acid.

Sulphur (crude brimstone) is worth about \$22 per ton at New York, and is found in the vicinity of volcanoes, both active and extinct.

There are many other rocks that have a commercial value. Clays vary in price from \$1 to \$20 per ton. Fuller's earth, which is used in filtering oils, is worth \$16 per ton at New York. Phosphate rock, used for fertilizer is worth from \$3.75 to \$20, according to its per cent of phosphorus. Pumice stone is worth from 1½ to 5 cents per lb. Rottenstone is worth from 3 to 7 cents per lb. Ocher, talc, soapstone, oilstones, whetstones, quartz, and numerous other minerals have a commercial value. In fact, there are so many rocks of commercial value that it pays to thoroughly investigate all unfamiliar rocks.

## The Petroleum Industry.

BY DAVID T. DAY.\*

A total output far in excess of that of any previous year, an unparalleled accumulation of stocks, and high prices for oil of all grades characterized the petroleum industry of the United States in 1907. The total production amounted to 166,695,345 bbls. or 22,119,862 metric tons, an increase of 39,601,399 bbls. over the production of 1906, which was 126,493,946 bbls., or 16,898,569 metric tons, the increase being greater than the total production of petroleum in any year up to 1889. The total value increased from \$22,141,735 in 1906 to \$120,106,749 in 1907. The average price decreased slightly, from \$0.731 per bbl. in 1906 to \$0.723 in 1907.

The rank of the leading petroleum states was changed materially during 1907, Kansas and Oklahoma, with a production of 13,333,640 bbls. in 1907 as against 21,718,648 bbls. in 1906, attaining first place, and California dropping to second place, though her production amounted to 39,748,375 bbls. in 1907 as compared with 33,098,508 bbls. in 1906.

The greatest change, however, was in Illinois, where the increased production— from 1,367,650 bbls. in 1906 to 12,261,973 bbls.—brought the state from ninth to third place, with an output more than fivefold that of 1906 and practically double that of Texas, which stood fourth in both years. Ohio, which stood third in 1906, with a production of 11,787,763 bbls., dropped to fifth place, its production amounting to 12,267,418 bbls. Pennsylvania's output in 1907—9,999,396 bbls.—put it in the sixth place instead of the fifth. West Virginia with a production of 9,095,296 bbls. in 1907, has seventh place instead of sixth; Indiana is No. 8, with 5,129,937 bbls., and Louisiana No. 9, with 5,000,221 bbls. in 1907, whereas in 1906 Louisiana's production was in excess of that of Indiana, and the states occupied respectively seventh and eighth places. New York, Kentucky and Tennessee, Colorado, Utah and Wyoming, and Michigan and Missouri complete the list in the same order as in 1906.

The rank of the states according to value of product is more significant than their rank according to quantity, as the value reflects the utility of the product. In this respect changes were also radical. In spite of a comparatively low price per barrel, the mid-continent product rose in value from fourth to first place because of the great yield of the Glean pool and because the completion of two pipe lines to the Gulf gave an outlet which, together with the decline in Louisiana oil, steadied the mid-continent price. The price of Illinois oil was also sustained well enough, notwithstanding the great output, to make the value of the product advance from ninth to third place, while California's increased production and price sufficed only to leave the value in sixth place as in 1906.

During 1907 a total of 18,855,691 bbls. of oil were consumed as fuel by the railroads of the United States, as against a total of 15,777,677 bbls. in 1906. The estimated length of line operated by the

use of fuel oil in 1907 was 13,593 miles, and the total length of line covered by oil burning engines is estimated at 14,797,111 miles, an average of 3,935 miles per barrel of oil consumed. Most of the oil consumed was crude oil, the remainder being residuum from the refineries, the product remaining after the lighter oils have been extracted.

This country is the greatest oil producer in the world, being more than 100,000,000 lbs. in excess of that of its closest rival, Russia.

## Copper Exports and Imports.

There has been a substantial increase in the exports of copper from the United States this year, principally to Germany, Great Britain and France.

Figures compiled by the government show that the exports for the first seven months of this year and last were as below, in pounds:

	1907.	1908.	Changes.
Belgium	1,514,454	3,747,156	2,232,702
France	2,500,517	68,901,915	67,401,398
Germany	51,486,336	89,685,015	38,198,679
Greece			
Britain	21,997,478	88,261,704	66,264,226
Holland	79,191,196	113,911,794	34,720,598
Italy	11,069,637	16,545,864	5,476,227
Russia	2,475,452	2,111,534	363,918
Other countries			
Europe	12,814,436	37,249,108	24,434,672
Total			
Europe	269,679,507	462,884,090	193,204,583
Canada	1,983,235	2,566,412	583,177
Mexico	230,128	209,208	20,920
China		13,735,899	13,735,899
Other countries	192,072	2,419,609	2,227,536
Total	212,095,011	521,446,948	309,351,937
Copper to ore and matte	6,318,785	5,289,846	1,028,939
Grand total	218,443,826	526,736,894	308,293,068

The greater part of the copper ore and matte exported went to Canada and Mexico.

The imports of fine copper for the same period amounted to 71,129,454 lbs., of which there was re-exported 718,541 lbs., making the net imports 70,410,913 lbs., and showing a falling off of 33,722,391 lbs. The copper contained in the ore and matte imported was 26,017,571 lbs., as against 38,508,105 lbs. in 1907; a decrease of 12,490,534 lbs.

The imports were mostly from Canada, Mexico and Peru.

## Foreign Fuel Trade of America.

Evidently exporters of coal and coke are not doing as much business as a year ago, judging by the figures below, which are for seven months, and represent tons:

	1907.	1908.	Changes.
Anthracite	1,489,514	1,857,289	367,775
Bituminous	5,644,218	4,897,677	746,541
Coke	212,036	368,392	156,356
Total fuel	7,345,768	7,123,358	222,410

The coal shipments were distributed as follows:

	1907.	1908.	Changes.
Canada	5,335,968	4,917,748	418,220
Mexico	654,559	124,608	529,951
Cuba	163,406	264,947	101,541
Europe	108,397	144,599	36,202
Other countries	576,472	522,124	54,348
Total	7,139,702	5,975,926	1,163,776

The coke shipped was destined principally to Canada and Mexico.

## Foreign Lead Trade.

Lead imports into the United States show a marked increase this year, as will be seen by the following figures, which cover the period of seven months, ending with July: Lead in ore and base bullion, 39,926 short tons, as against 35,651 tons in 1907; lead in pigs, bars and old, 1,665 tons, against 7,197 tons in 1907; total, 61,591 tons in 1908, against 42,841 tons in 1907—an increase of 18,750 tons, or nearly 44%.

Of the imports this year Mexico supplied 59,097 tons of lead in ore and base bullion, as against 30,460 tons in 1907; Canada, 611 tons, against 4,999 tons; while the remainder came from various other countries. The lead in pigs, bars and old was imported largely from Europe.

The re-exports this year amounted to 41,636 tons lead in ore and base bullion, as against 26,037 tons in 1907. There was also shipped last year 21 tons of lead in pigs, bars and scrap.

\*Extract from Mineral Resources of U. S. for 1907.

# Development of Power in the Spokane River

By GEO. A. OHREN.

The city of Spokane, Wash., is surrounded by many valuable sources of wealth—rich mines, fertile agricultural districts, and excellent timber. One of the most valuable of Nature's gifts to this section is the water power, now only partly developed, that may be derived from the Spokane river.

But a few years ago the 105,000-hp. flowing in the Spokane river, from Post Falls above to Little Falls below the city of Spokane, hurled itself un hindered over the glistening rocks, foaming onward to the ocean. Today nearly one-half of the minimum flow of this powerful stream has been turned into modern water wheels, producing 50,000 electrical horsepower, which is used for lighting and industrial purposes throughout this district; operates 280 miles of the city and interurban railway; runs the flour

*Generation of electricity on Spokane river for lighting and industrial purposes. Electric power for Coeur d'Alene mines in Idaho. Cost of power.*

*Operations of the Washington Water Power Co., the Spokane and Inland Empire Railway Co. and others.*

it in  $\frac{3}{4}$  mile. The falls at this point are capable of furnishing a minimum of 32,000-hp. extreme low water, 68 ft., or about 15,000-hp., of which is now developed.

Post Falls are rated at about 18,000-hp., over 15,000-hp. of which is developed;

he developed before the end of the present year.

Chief among the companies exploiting the power of the Spokane river is the Washington Water Power Co., a consolidation of several of Spokane's pioneer street railway and electric power companies. This concern has power plants at Post Falls, Spokane, and one is in the course of erection at Little Falls. The company controls an excellent street railway system in Spokane and operates interurban lines, with up-to-date rolling stock equipment, to Medical Lake and Cheney, to the south. It has 360 miles of 60,000-volt power transmission lines, running east from Spokane as far as Burke, Idaho; south to Palouse and Colfax and west to Lind in the Big Horn country.

The premier power plant of the Wash-



Upper Spokane Falls, Washington.



Below Spokane Falls, Showing Conduits to Power House.

mills of the Palouse, and lights the mines and drives much of the machinery in the Coeur d'Alene silver-lead district in Idaho, 100 miles east of Spokane.

The Spokane river, which has a fall of 734 ft. between Coeur d'Alene lake and a point below Little Falls, in the heart of the city of Spokane has a fall of 134

the falls at Nine Mile bridge have a capacity of 20,000-hp., of which 15,000-hp. will be under development within the next few months, and at Little Falls, by means of an 800-ft. main and wing dam, the natural fall will be doubled, giving a head of 68 ft., capable of furnishing 30,000-hp., the greater part of which will

ington Power Co. is the one at Post Falls, shown herewith. This station is modern in every respect and embodies many of the latest improvements in high voltage electrical apparatus. It will be seen that the dam serves as the upstream wall of the building, the plant being built over one of three channels that the



Post Falls Power Station, Washington Water Power Co.

river has cut in the granite at this point. Another illustration shows one of the other channels and gives a general view of the dam. There are five 3,250-hp. water wheels in this plant, turning 2,250 kw., 3-phase, 60 cycle, 2,300-volt generators. The current from these generators is delivered to the transformers at 2,300 volts and stepped up to 60,000 volts.

The power plant now being built at

tion, which is a consolidation of a number of city and suburban railway lines, operates an electrical street railway system in Spokane and maintains up-to-date interurban lines to Coeur d'Alene, Idaho, and to Colfax and Palouse in southern Washington. This company has a steam-electric generating plant, but has been buying much of its electric power from the Washington Water Power Co., paying \$20 per hp. per annum at the

light and comfort for their homes; to the city of Spokane, low-priced power for manufactories, and railway facilities that bring the country within a radius of 100 miles to her very door.

### Production of Mineral Waters.

The sales of mineral water in the United States in 1907, as reported to the United States Geological Survey, show that the financial crisis came too late in the year to affect materially the business done by well and spring owners. The total sales of table and medicinal waters amounted to 52,060,520 gallons, valued at \$7,331,563, compared with 48,108,580 gallons, valued at \$8,028,387, in 1906, an increase in quantity of 3,951,910 gallons and a decline in value of \$96,884. The lessened valuation is due to the lower selling prices reported by a number of springs, the result, probably, of competition. The survey, in its totals, takes no account of strictly artificial waters nor of the water used in making such sweetened beverages as ginger ale, sarsaparilla, etc., but figures returned by spring and well owners show that 5,255,535 gallons of mineral water, valued nominally at \$303,115, were used for soft drinks in 1907.

Of the states that last year produced over 1,000,000 gals. of mineral water, Minnesota is first, with a total of 9,654,030 gals., valued at \$521,800; most of this output is from a few springs selling large amounts of table water. New York is second on the list, with 7,176,815 gals., valued at \$686,574. This production includes low-priced natural spring waters and the medicinal Saratoga waters. Wisconsin comes third, its output for the year being 6,839,219 gals., valued at \$1,526,703; the high valuation compared with New York is accounted for by the large output



Post Falls and Dam With Bear Trap Gate Open.

Little Falls will be a 4 or 5-unit installation to begin with and will be along the lines of the Post Falls plant.

The Spokane power plant, shown herewith, is supplied with water through three 10-ft. and two 7-ft. steel conduits, several hundred feet in length. Five big water wheels in this building develop over 15,000-hp. and operate two 3,000-kw., 4,000-volt generators, two 2,250-kw. generators, a 750-kw. and a 300-kw. generator, two 1,000-volt and two 500-volt motor generator sets, and some machinery that was part of the old plant.

The greater part of the plant, including switchboards, switches, transformers, etc., is strictly modern, and at the present time the company is installing another up-to-date 3,000-hp. unit. It is the intention of the company to develop the full head of 134 ft. as soon as it can do so consistently.

The electricity from the larger generators is stepped up from 4,000 to 60,000 volts. The city lines carry 4,000 volts for industrial purposes; a 2,300-volt current is used for the 3-wire Edison lighting system, and 500 volts for running the street cars.

This company also has a Curtis steam turbine plant in Spokane, which, of course, does not come under the head of water power development. All of the company's plants are connected so that the power from any one may be used at the other.

At Nine Mile bridge the Spokane & Inland Empire Railway Co. is building a modern 15,000-hp. hydro-electric plant, which will cost \$1,000,000 and will not be finished for a year. This organiza-

switchboard. The Spokane & Inland Empire Co. will soon have more power than it will require for its own needs on its Nine Mile plant.

Water power can be secured in Spokane for as low as \$10 per hp. per annum. The prevailing price for electric power is



Spokane Falls and Power Plant, Washington Water Power Co.

about \$20 per annum, although the Coeur d'Alene mines pay a higher figure than this.

Electric power, developed from the energy of the Spokane river, has brought to the outlying districts of this country cheap and rapid transportation: to the farmers, power for their machinery and

of bottled carbonated waters from the famous springs at Waukesha. Massachusetts takes fourth place, having produced 4,661,115 gals., with a total valuation of \$208,572. The fifth state in order is Virginia, its output having been 2,442,075 gals., with the relatively high value, most of it being medicinal water, of \$131,770.

# The Occurrence of Manganese Ore in Virginia.

By E. C. HARDER.\*

Manganese deposits are found in Virginia in the Piedmont region and in the Appalachian valley. The ore of the Piedmont region occurs in the James river valley north and south of Lynchburg. There are a number of old mines in this district, but only one, that of the Piedmont Manganese Co., is at present producing. The deposits occur in residual clay and sand derived from ancient crystalline rocks. In general, the ore occurs in nodular masses, ranging in weight up to 500 lbs. and scattered through a yellowish-brown micaceous clay forming a nearly vertical layer between decomposed granite and quartzose mica schist residuum. The original nature of this ore-bearing layer is unknown.

The Piedmont Manganese Co.'s mine is situated on Beaver Creek, in Campbell county, about seven miles southeast of Lynchburg. In the present workings the ore occurs in masses in a yellow and brown micaceous clay bed dipping steeply southeast and having a general northeast-southwest strike. This layer is between a decomposed granite on the hanging wall and a residual micaceous clay on the foot-wall. The latter is very similar to the ore-bearing clay and grades into it, the ore increasing in quantity toward the granite contact. The hanging wall also grades into the ore deposit through a zone partially replaced by manganese oxide. The ore-bearing layer as exposed varies from 5 to 10 ft. in thickness, but ore is said to occur at intervals for 50 ft. from the hanging walling granite. In places the ore masses are closely grouped, and the clay form a very small part of the bed; while elsewhere the clay may make up over one-half of the layer. Surface outcrops occur at intervals along the strike for a quarter of a mile northeast. The presence of ore bearing layers parallel to the one now worked has been shown by surface pits.

Apparently about the same conditions prevail in the old unworked mines of the district. In the Lets mine, about 1½ miles northeast of the preceding, ore occurs in a similar brownish-yellow micaceous clay between decomposed granite and schist and as a replacement of the adjacent part of the granite. Surface workings on the Saunders property, one mile east of Evington, show nodular ore in a yellow and red residual clay, having a decomposed mica schist as foot-wall. In the Cabell and Piedmont mines, about two miles north of Warminster, granite and schist are again in evidence, but relations are somewhat obscured by the age of the workings.

A characteristic associate of many manganese deposits in the Piedmont region is a manganese stained earth or clay known as "umber," which is a residuum of some formation as yet unknown. Crystalline limestone has been found with it and may be a clue to its origin as well as to the origin of the deposits.

The Appalachian valley deposits may be conveniently divided into two types, those

*Manganese ore found in masses weighing up to 500 lbs. and of good quality. Some unworked mines.*

*Geology of ore deposits in the Piedmont and Appalachian valley regions.*

of the valley of Virginia and those of the New River region.

The chief deposits of the valley of Virginia occur on the west slope of the Blue Ridge from Front Royal on the north to Roanoke on the south. Through this area manganese deposits are found at irregular intervals near the foot of the mountains. The same region includes the Blue Ridge iron ore mines, most of which contain some manganese ore, frequently in such quantity as to form a manganeseiferous iron ore. Similarly, most of the manganese deposits contain some iron, especially near the surface.

The Blue Ridge occupies the contact between the ancient crystalline rocks of the Piedmont region and the Paleozoic sediments. The latter, although nearly vertical, have a general westward dip on the west slope of the mountains. The succession of formations from west to east is: Shenandoah limestone, Cambrian shale, and Cambrian quartzite. The Cambrian quartzite occupies the main west slope of the mountains; the shale, a gently sloping bench at the base; and the Shenandoah limestone, the valley to the west.

The manganese deposits occur in the shale area near the contact with the underlying quartzite. With a few exceptions they are pockets of local concentration occurring in residual clay. With regard to texture, the ore is of four varieties: (1) Kidneys of black psilomelane embedded at intervals of clay. (2) Irregular masses, often porous, of psilomelane with frequent layers or nests of crystalline pyrolusite, embedded in clay. This form is frequently assumed by local ore segregations in a manganeseiferous clay. (3) Breccia ore in large masses, with sandstone or chert fragments, and either psilomelane or pyrolusite as cementing material. (4) Replacement and cavity fillings in sandstone or sandy clay. This type is largely composed of crystalline and granular pyrolusite with associated psilomelane.

The manganese ores are widely distributed along the Blue Ridge ore belt, but it is only occasionally that they are sufficiently concentrated to form a workable deposit. In such deposits there are alternating layers, lenses, or irregular layers of barren and ore-bearing clays. Frequently one body of clay will have a certain type of ore, while an adjacent mass will have another type. Of the numerous mines along this belt only the Crimora, the Lyndhurst and the Vesuvius are at present in operation.

The Crimora mine is situated in Augusta county, about two miles east of

Crimora station, on the Shenandoah valley division of the Norfolk & Western railroad. The ore deposit is located in an elliptical basin in a canoe-shaped syncline of the "Lower Cambrian" quartzite.

The basin has a general north and south trend and is about ½ mile long, ¼ mile wide, and about 200 ft. deep. It is filled with yellow, red and variegated clays. The ore is hard and of three varieties: (1) Kidney ore of black psilomelane, (2) replacement and cavity fillings of psilomelane and pyrolusite in sandy clay, and (3) irregular pockets in manganeseiferous clays.

The ore masses occur segregated in local layers, lenses and irregular bodies of clay, separated by barren areas. Near the surface it is quite ferruginous.

The Crimora mine consists of a large open pit near the center of which there is a shaft connection with the long drainage tunnel. At present operations are conducted on a very small scale, and consist in taking out the ore left between the old levels. There are still about 175 ft. of workable ground left between the bottom of the pit and the level of the tunnel, and nearly half of this is untouched by former workings.

The Lyndhurst mine is located in Augusta county, about 2½ miles south of Lyndhurst, on the Shenandoah valley division of the Norfolk & Western railroad. This deposit consists of (1) scattered kidneys and (2) irregular masses in clay. The former occur in small, irregular nodules averaging an inch or two in diameter, but occasionally reaching 5 or 6 in. These are scattered through horizontal layers or lenses of red, brown and variegated clays at intervals of a few inches to a foot or more. Mingled with the light colored clays are layers and lenses of dark manganeseiferous clays which contain the second type of ore. These vary from seams to irregular masses of various sizes, both hard and soft.

The ore occurs scattered at irregular intervals in a pocket which has been tested to a depth of 60 ft. and a horizontal extent of 300 yds. On account of the scattered nature of the ore, much dirt has to be washed to get a small quantity of ore. The extent of the deposit, however, seems to be such as to warrant this expense. The mine consists of several shafts, with drifts at five levels.

The Vesuvius mine also is located in Augusta county, about 1½ miles northeast of Vesuvius. The deposit is in a pocket, whose extent has not yet been determined, at the foot of the Blue Ridge. The workings consist of some old open pits, a shaft with underground workings recently abandoned, and a new shaft started west of the old workings. The ore is of two varieties: (1) Breccia, occurring in large masses, with chert or sandstone fragments and either psilomelane or pyrolusite as cement, and (2) kidneys of ore from 3 to 6 inches in diameter, embedded in clay. The breccia ore masses frequently have a thick coating of botryoidal psilomelane. Resides

\*Extract from Mineral Resources of U. S. for 1907.

those mentioned, there are many unworked mines in this belt.

The manganese deposits of the New River region occur in several belts south of Pulaski, Wytheville and Marion. The ores occur here associated with the lower part of the Shenandoah limestone, and almost invariably iron ores are associated with them. In the deposits visited the ores do not seem to occur as kidney masses so prevalent elsewhere in Virginia, but rather in large, porous masses, containing varying quantities of brown hematite ore and much included clay and sand. Very little ore has been produced in this district, most of it coming from the Umbarger and the Currin Valley mines, southeast of Marion.

The Umbarger mine is situated about 1½ miles east of Sugar Grove, Smyth county. The main ore deposit consists of large masses of mixed porous psilomelane, brown hematite and sandy clay. These masses range in size up to 6 or 8 ft. in extent, are of irregular shape, and occur in yellow or red clays. Ore has been taken out from a few cuts near the surface. Besides this, ore occurs scattered through a considerable area as small, irregular nodular masses, mainly psilomelane with some included pyrolusite, in yellow and red clay.

The Currin Valley mine is located about 1½ miles south of Attoaway, Smyth county. The workings consist of a large open pit from which considerable brown hematite has been taken. The ore occurs in large masses and is a mixture of manganese ore, brown hematite and sand or clay, occurring locally in variegated clay. Manganese ore also occurs at the Atkins mine, southeast of Attoaway; on the Walker and Tate properties north of Sugar Grove; at the Eagle Cliff mine near Ivanhoe, Wythe county; at Allisonia, Pulaski county, and at several localities south of Wytheville.

Manganese ore is found at several localities in Virginia outside of the three districts mentioned, among which are those occurring in the Oriskany iron ore area in Shenandoah and Frederick counties near Seven Fountains and Cedar Creek. Small deposits occur near Dagger Springs, Botetourt county, and at other localities to the southwest.

### Sulphur Production of U. S.

The importance of the sulphur industry in America, reports the Federal survey, has grown rapidly within the last few years, and the phenomenal production of 294,123 long tons in 1906 was nearly equaled by the production in 1907, which amounted to 293,106 tons, while the value of the product increased from \$5,096,678 in 1906 to \$5,142,850 in 1907.

The figures for the value of the greater part of the output during 1907 have been compiled from current market prices in New York, which ranged from \$22.15 per long ton for the first nine months of the year to \$19 per ton at its close. From the New York prices the value of the product at the mines has been computed.

Iron ore exports from Bilbao, Spain, from Jan. 1 to Aug. 21, were 2,083,813 metric tons.

### Buhrstone and Millstone Industry.

BY W. C. PHALEN.\*

The production of buhrstones and millstones in the United States during 1907 was valued at \$31,741. This is a considerable falling off from the values reported during the last few years, and the present condition of the industry approximates that of about eight years ago.

The market for millstones has been greatly curtailed of late years. The table given herewith shows that recently the industry has dwindled very much and that the value for 1907 is less than one-third of that for 1887. This falling off in the millstone industry is due to the introduction of superior forms of grinding machinery, chiefly rolls, ball mills, etc. The roller mill process of grinding is now used almost exclusively in grinding wheat. Some corn and mustard mills in the Southern states still use hand-made millstones. A part of the product is sold to the cement and talc manufacturers and grinders of mineral paint.

The production of millstones, as usual, came from but four states, namely, New York, North Carolina, Pennsylvania, and Virginia. Though stone suitable for buhrstones and millstones is found in other states, there was no production from them.

**Millstone Industry in New York.**—New York has led for many years in the production of millstones and chasers, the latter term being applied to stones which run on edge. The raw material is obtained in Ulster county, southeastern New York, and is known as Esopus stone, Esopus being an early name for Kingston, which was formerly the main point of shipment. The material suitable for millstones is quarried from the Shawangunk grit, a quartz conglomerate found near the western base of Shawangunk mountain in the valley of Rondout river. The material suitable for millstones is exceedingly limited, being confined in linear extent to a strip extending from High Falls on the north to Kerhonkson on the south, a distance of approximately 10 miles. Beyond these limits the texture and other properties of the rock have been found unsuitable for the highest grade of stones.

The methods employed in quarrying the rock are simple. The rock is pried or split out, advantage being taken of the joint planes, especially the concentric surface joints. The tools used are the ordinary hand drill, together with plugs and feathers. Blasting is often resorted to, but the charges of powder are usually light. The rough stones thus obtained are quarry dressed and finished, these operations being performed entirely by hand, the chief tools employed being the bull point and hammer.

The operation of drilling the "eye" is performed by centering the stone and then drilling from the center of both faces inward. In many stones the eye is square. To fashion a square eye, a round eye is first drilled out and then squared up. A few of the men engaged in the industry make a modification of the regular millstones for use in the grinding of paint.

\*Extracted from Mineral Resources of U. S. for 1907.

In this modification the ordinary millstone is cut in halves and an iron casting is placed between the halves, which are then banded together by an iron band.

Chasers are larger than the regular millstones. They are used for heavier work, as in grinding quartz, feldspar, barytes, etc., and, as already mentioned, they run on edge. Though they are made with a diameter as short as 24 ins., they are usually turned out with diameters ranging from 50 to 84 ins. and with thicknesses as great as 22 ins. These chasers are run on pans paved with blocks of Esopus grit, which are usually roughly cubical with edges about a foot in length. In grinding quartz in such pans the chasers are used in the preliminary crushing; then rough blocks, usually three in number, are either attached to or carried along by lateral arms, which in turn are joined to a vertical revolving shaft. By the circular movement of these blocks the material placed in the pan is ground to powder.

In the following table are given the values by states of buhrstones and millstones produced in the United States from 1885 to 1907:

State.	1905.	1906.	1907.
New York .....	\$23,915	\$28,848	\$23,072
Virginia .....	8,186	15,011	4,584
North Carolina .....			
Vermont .....	\$2,522	\$1,507	\$1,969
Pennsylvania .....	1,353	2,624	2,918
Total .....	\$37,974	\$48,590	\$31,741

\*No production of buhrstones from Vermont in 1905, 1906, and 1907.

The table, showing the value of imports in 1906 and 1907 follows:

Year.	Rough.	Made into millstones.	Total.
1906 .....	\$22,921	\$277	\$23,198
1907 .....	28,421	817	27,508

The value of the imports of buhrstones and millstones into the United States during 1907 was the lowest recorded in five years. This marked diminution was in the value of the rough material, as the value of the imports made up into millstones showed a gain. This latter value, however, is still insignificant.

### American Tin Imports.

Importers have not been enjoying as remunerative a business as they did a year ago by reason of the fact that with the smaller consumption prices have receded to a point that does not compare favorably with 1907.

During the seven month ending with July the imports of tin into the United States amounted to 22,801 short tons, having an invoice value of \$13,306,072, which compares with 28,084 tons, \$22,822,776, or the corresponding period in 1907.

Of the imports this year Great Britain furnished 16,757 tons, as against 16,020 tons in 1907; Straits Settlements, 5,378 tons against 9,558 tons; Australia, 145 tons against 569 tons; Holland, 134 tons against 870 tons; while the remainder came from various other countries.

Re-exports of foreign tin this year amounted to 155 tons, against 373 tons in 1907.

Denmark imported 2,998,000 tons of coal and 158,000 tons of coke last year.

# Apparatus for Extracting and Filtering Ore.

By J. E. PORTER and A. L. CLARK.

Our apparatus (U. S. patent No. 887,288, May 12, 1908) is especially useful in the treatment of low grade highly refractory sulphide ores which are unsuitable in their raw state for cyaniding or for profitable treatment commercially by any process.

Fig. 1 is a partial sectional side elevation of apparatus embodying the invention on the line 1-1 of Fig. 3. Fig. 2 is a partial sectional elevation of the apparatus on the line 2-2 of Fig. 3; Fig. 3 is a top plan view of the apparatus; Fig. 4 is an enlarged detail vertical sectional view taken through one of the cylinders of the apparatus; Fig. 5 is a diagrammatic view illustrating the apparatus.

Referring to the drawings, A represents a suitable tank, which may be constructed of wood or metal as desired. In this instance the tank is shown as constructed of wood. Any suitable construction may be provided for the tank, and in this instance the tank is provided with a flaring upper edge B to prevent the material from boiling over.

The tank is provided with a rigid false bottom C of suitable porous material, as for instance earthenware or material from which porous cylinders are made. Any suitable porous mineral septum may be used for a false bottom C, through which air and liquid may be forced or sucked as desired.

As shown, the false bottom C is constructed of slabs supported from the sides of the tank in any suitable manner, as by means of the angle irons D and supported at the meeting edges or joining surfaces of the slabs by means of brackets E, carried upon the bottom F of the tank and secured thereon in any suitable manner. Preferably metal straps G are arranged above and below the meeting edges of the plates forming the false bottom C, and bolts H pass through the straps and the brackets E.

Means are provided for forcing air into the space I between the bottom F and the false bottom C or for causing suction underneath the false bottom C, in this instance pipes J being provided branching from the main pipe K, said branch pipes either extending through the bottom F or communicating with the apertures therein. If desired liquid, as water or a solution of any character may be forced through the pipes K and J.

Means are provided for raising and lowering the porous cylinders O out of and into the tank A. These cylinders are preferably constructed as indicated in Fig. 4, in which the porous cylinder O of suitable material, as for instance earthenware, is secured in a collar P which is screwed onto the head or casting Q, in turn carried onto the screw threaded end of the pipe R.

As many of the porous cylinders and supporting devices are provided as desired, and preferably the cylinders are arranged in staggered form, as indicated in Fig. 3. Preferably the distances between centers of the cylinders are all substantially

*An improvement upon the construction and operation of ore treating apparatus, whereby efficiency of same is increased.*

*Cycle of operations in cyaniding dry crushed ore in new apparatus.*

tially equal, thereby obtaining a maximum effect in the tank. Also suitably screwed or otherwise secured to the head or casting Q of a cylinder is a pipe S extending the full inside length of the cylinder and open at the bottom near the inner bottom of the cylinder.

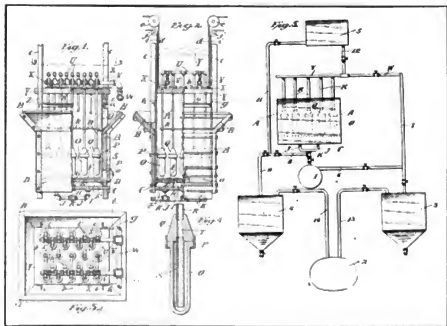
All of the cylinders are provided with the pipes S, which may be removed as desired and replaced by pipes of different length. The head or casting Q of a cylinder is shown hollow, being provided with the passageway T, so that a continuous passage is formed by the pipes

tions b above the cross beams Y, whereby the upper portions of the pipes may be removed from the lower portions or else the cylinders may be removed with portions of the pipe R as desired.

We are not to be understood as limiting the invention to the construction of cylinder and supporting means shown and described for any suitable means have been disclosed for carrying out the objects of the invention.

As shown, vertical standards or uprights c are provided extending upwardly from the tank forming ways for guiding the cross beams Y and side beams Z of the frame work and means are provided for raising and lowering the frame work, in this instance ropes or chains d being shown extending over pulleys e. These ropes or chains may be provided with counterweights or connected to suitable engines or motors.

Preferably means are provided for heating the mass undergoing cyaniding or other treatment, and in this instance a



Sectional and Diagrammatic View of Extracting Apparatus.

R, passages T and the pipes S. The pipes R all connect with branch pipes U, leading to longitudinal main pipes V, from which air pressure or suction or water or solution may be supplied.

The main pipes V communicate with a cross pipe W, which in turn leads to the vacuum tank or air pressure receiver. The longitudinal pipes V are supported in suitable cradles X from the cross beams Y, which in turn are carried by the side beams Z on the angle irons a.

Any suitable construction may be provided for the frame carrying the piping, whereby the frame may be raised and lowered. In this instance the pipes R are joined and provided with flanged connec-

steam coil is provided comprising the pipes f extending back and forth over the area of the tank between the rows of cylinders O, and vertical pipes g and h lead upwardly from the horizontal pipes f to conduct the steam to the coil and carry off the exhaust steam.

Means are provided for raising and lowering the steam pipes, in this instance chains or ropes i being provided carried over the pulleys j and attached to counterweights or adapted to be operated by a motor or engine. Preferably braces k are provided between the pipes R to keep them from swaying. Any suitable braces may be provided for the remainder of the tank and apparatus. Preferably there is

a gate *o* for the flushing out opening *p* at the lower portion of the tank.

In the operation of the apparatus, let it be assumed that dry crushed ore is to be cyanided in our apparatus. To the tank A is first added a certain quantity of water, less than the total amount required for the operation and the steam coils *f* are lowered into the water, and steam is turned through the coils to commence the heating.

The agitation of the liquid is also commenced by turning on air pressure into the pipes K and J leading underneath the false bottom C. The compressed air is forced through the porous false bottom and passes into and through the liquid in finely divided streams, or in other words the air is atomized as it were by means of the mineral septum, and in passing into the liquid keeps the same in constant and gentle agitation throughout. The cylinders O having been lowered into position in the tank, the ore to be treated is charged into the tank by degrees.

While the ore is being charged in, the air pressure is turned on in the pipes W, V, U and R, thereby forcing air out through the porous cylinders O into the mass. The liquid is also agitated by the air passing through the porous false bottom and the porous cylinders, thereby keeping the finely divided material in a state of suspension. The air emerges from the rigid porous mineral material in the form of evenly distributed, excessively minute bubbles, and the presence of a constant succession of these minute ascending bubbles in every portion of the mass keeps the fine particles of ore in suspension, permitting no packing or clogging, insuring that each individual particle shall be constantly in contact with a jacketing layer of thoroughly aerated liquid. Next the desired quantity of alkaline earth oxide is added to the material in the tank sufficient to neutralize any acidity in the ores.

If the ore is of such a nature that it can be ground wet to alkalinity this is not necessary. At the end of about  $\frac{1}{2}$  hour, more or less, the material in the tank will be heated up to the desired degree, which would be about 190 degs. F. and the acidity will be removed. The calculated amount of cyanide is then added to the mass and the solution is brought up to the required volume and strength in the tank by the further addition of water if required. The agitation and heating are continued for about five hours, the initial strength of the solution being about 0.25% of potassium cyanide. The heat is maintained about 190 degs. F.

At the end of about five hours, the solution in the tank is strengthened to about 0.6% of potassium cyanide by the addition of more cyanide, and the agitation and heating are continued from about 10 to 15 hours longer. Constant bulk may be maintained by the occasional addition of fresh water.

At certain stages of the operations alkaline earth oxide or peroxide is added for two reasons, first, to neutralize any carbonic acid that might be present or have been formed, or that contained in the injected air; secondly, to produce a

coagulating or flocculating effect and maintain the said effect throughout the treatment, not allowing any resolution of the alkaline earth compounds during the treatment. Preferably the alkaline earth oxide or its hydrate is maintained in excess in the solution to effect the coagulation. If peroxide is used the additional effect is produced of supplying oxygen to the solution.

At the end of the agitation period the steam coils are raised from the bottom of the tank to an elevated position. Agitation is continued through the false bottom C while the air pressure is withdrawn from the cylinders O and suction applied through the piping, thereby filtering the solution through the porous cylinders O.

By maintaining the air pressure through the false bottom C while suction is applied to the interior of the cylinders O, the filtering operations are very greatly aided and made more efficient, because the agitation of the mass by the air rising from the false bottom causes the slimes to become thoroughly mixed and prevents them from stratifying, packing, or adhering tightly on the porous cylinders during filtration.

This is one of the great advantages of the apparatus, owing to which very much more rapid filtration and efficient results are produced than in any other apparatus hitherto devised. Furthermore, the upward air currents through the mass keep the liquid circulating or splashing over the entire sides of the cylinders so that instead of having air only sucked through the upper portions of the cylinders, thus losing the vacuum effect, the entire mass undergoes filtration. The mass is therefore forced up on the sides of the cylinders instead of leaving the upper portions of the cylinders bare.

After the agitation and suction have been continued for the desired time, more water is added to the tank and the suction is continued with agitation through the bottom, thereby removing the valuable solutions which remain in the mass after the first filtration. The agitation stirs up the material in the bottom of the tank and forces it up around the sides of the cylinders.

Another way of treating the mass after the first filtration is to force water outwardly through the porous cylinders O from the interior through the piping, thereby cleaning the surfaces of the cylinders. When the desired amount of water has been forced into the tank the water pressure is removed, and the whole system of cylinders and piping is raised out of the tank, and any suitable form of mechanical agitator lowered in the mass in the tank and operated to agitate the mass mechanically thereby breaking up any lumps that may have remained. At the same time air is continued to be forced through the porous false bottom C to agitate the mass and aid in breaking up the particles therein.

After the particles are all broken up and in suspension in the solution the mechanical agitator is removed and the porous cylinders are again lowered into the tank and suction applied to filter the so-

lution as before, while air is being forced through a porous false bottom C.

These operations are repeated as often as necessary to remove the valuable solutions. Finally the pressure in the pipes K and J at the bottom of the tank is removed and suction applied to said pipes, thereby filtering the remaining solution through the porous false bottom C and thus recovering the lost portions of the valuable solutions.

In Fig. 5, compressed air is supplied from tank 1 to either the cylinders O in the tank A, or beneath the false bottom C, or to both at the same time. Two (2) represents a vacuum tank by means of which a vacuum may be applied to the cylinders O through the receiver 3 or applied to the bottom C through the receiver 4, or to both at once. Water or solution may be supplied to the cylinders O or to the bottom C, or to both from the tank 5.

Suitable piping and valves are provided for carrying out these objects. The air pressure tank 1 is connected by pipe 6 with pipe 7, which in turn connects with the supply pipe W and with the receiver 3. Air tank 1 is also connected by pipe 8 with pipe 9 which leads to receiver 10, and pipe 11 connects pipe 8 with water tank 5. The water tank is also connected by pipe 12 with pipe W. The vacuum tank 2 is connected by pipes 13 and 14 with receivers 3 and 4 respectively. The pipes are provided with suitable valves for enabling the apparatus to be connected with the various tanks as desired.

### Belgium Fuel Trade.

Business in the current year shows a slight variation from 1907.

The production of coal for the first half of this year and last, according to district, compares as below, in tons:

District.	1907.	1908.	Change.
Charleroi	4,179,950	4,224,250	1,23,078
Liege	2,462,270	2,445,540	17,720
Mons	2,522,488	2,400,610	123,078
Centre	1,802,117	1,747,240	54,807
Herve	463,290	554,890	91,310
Namur	445,310	441,390	4,010
Total	11,868,655	11,813,650	55,005

There were 144,176 people employed in the coal mining industry on July 1, this year, as against 140,843 on the same day in 1907.

The foreign trade in coal for the seven months ending with July was as follows: Imports, 3,006,702 tons, against 3,056,055 tons last year; exports, 2,611,508 tons, against 2,676,805 tons in 1907.

Coke exports for the first seven months this year amounted to 498,637 tons, as against 495,129 tons for the same period in 1907.

The bulk of the fuel imported comes from Germany and Great Britain.

The production of iron in the Federated Malay states for the six months ending with June amounted to 24,659 long tons, as against 23,355 tons in 1907.

The gold output of the Grand placer in Surinam in the Dutch East Indies for the first half of 1908 was 21,040 grams.



# The Prospects of the Cobalt Central Company.

By ALEX GRAY.

As a mining proposition capitalized at \$3,000,000 and controlling 777 acres in and about Cobalt's proven areas, the Cobalt Central Co. should be dissociated from much that is published about it, both as to new discoveries and abnormal milling results.

In point of acreage the company is second only to the Nipissing. Strategically its claims present many speculative potentialities. Whether it be upon the ridge pre-empted by the Hudson Bay, Tretheway, Coniagas, Buffalo, City of Cobalt and Silver Queen—all producers from the conglomerate, or from the diabase country exploited by the Kerr Lake, Drummond and other mines—the Cobalt Central is apt to participate in all forward movements. Being the holding company, and having absorbed the Standard Cobalt and the Wright Silver mines, it calls for expert management in order that actual merit shall not be obscured by foolhardy haste to promote market movements. Much has been accomplished and more will be, to the betterment of the units within the company, but until the producing factors have demonstrated their ability to earn enough to carry to the outputting stage the various claims of undoubted advantages, it is doubtful if dividends will be ordered. Consulting Engineer Elmer and his staff, fully realizes that the active occupation of all strategic positions might weaken the line of cash communication, and it is this that suggests conservatism in the Cobalt Central administration pending complete disclosures in or near by the several blocks.

Like the Nipissing, the Cobalt Central has dual organization. The operating companies are the Standard Cobalt Mines, Ltd., and the Wright Silver Mining Co., Ltd., having title to the 777 acres. All the shares, except five shares in each, are owned by the Cobalt Central Mines Co. It is not explained how the areas were allocated originally or whether there are special reservations in the matter of profits. All of the profits of the operating companies, with the exception of the five shares in each as noted, go to the holding company, and how these are to be disposed of with reference to the undeveloped ground is what shareholders wish to learn. It is not improbable that the leasing system will be resorted to as a solution. Mr. Elmer, Superintendent Young, and Underground Manager Snyder, being familiar with Colorado and Nevada precedents in this regard. Heretofore Cobalt mine owners declined to entertain leasing propositions. Not being mining men they were unable to appreciate why they should accept a royalty, however large, when they could have all their mines produced. Now it has become clearer to them that lessees paying 25 to 50% gross or on smelter returns are preferable to wagon loads of dollar script issued at 10 cents, and the success of the experiment at Peterson Lake may induce the Cobalt Central Co. to do something of the sort to expedite exploration work. The Peterson Lake Co.'s terms are five

*Controls the second largest mineral territory in the Cobalt district. The leasing system, and why it is preferred. Development work done and ore bodies uncovered.*

*High extraction of silver in milling. Explanation of the problem of wet concentration of Cobalt ores.*

years, 25% of the gross and so much development annually. They are onerous where mining and metallurgical charges are so heavy, but the departure is a significant one, indicating the growing comprehension of Cobalt's requirements.

Unfortunately, most of the Cobalt companies had insufficient working capital. With its hundreds of acres the Cobalt Central has to await initial outputting results before proceeding to deal with its

base, and evidence the necessity of larger operations where the Kerr Lake and Drummond and the Lemiskaning and the Ladger have been fortunate.

These areas together with the Gamey block, adjoining the Coniagas and Buffalo, constitute the very encouraging assets of the Cobalt Central.

About 100 men are employed at the Big Pete, nine rock drills are in use, and at the 65-ft. level, 600 ft. of driving is in ore throughout. At the 115 level 900 ft. of driving and crosscutting confirms the continuity of ore bodies. The station at 195 ft. disclosed good ore, and as stated elsewhere, there is no diminution in values in the shaft at 250 ft. Superintendent Young and Mr. Snyder are keeping their development well ahead of the mill, and as the Big Pete is proving lot 38, and recent finds are making easier the exploitation of the Bailey leased ground, the Cobalt Central should be making large showings in another year.

The concentrator erected by the Cobalt



Cobalt Central Mines.

claims, each likely to call for extensive workings and installations. Thus far the Big Pete has contributed most of the revenue, and its underground plans are the best tribute to Mr. Snyder's capabilities. Stopping has begun, the shipping vein at 250 ft. has maintained its strength and values, a new ore body promises to supplement earnings represented to be adequate for all other work, besides creating a balance available for dividends.

On lot 38, which lies between the Big Pete and the Silver Leaf mine, a double compartment shaft is being sunk on a vein which outcrops for some distance. Other discoveries have been made here, and this lot is expected to yield fancy returns. A lease has been obtained on the Bailey block adjoining, and as the basis is 50% royalty, the Cobalt Central management evidently has confidence in the locality. Further southeast on lots 60 E. and 70, outcropping bodies affirm the extent of mineralization in the dia-

Central is conducted by J. W. Moffett, formerly of southern Colorado. His practical knowledge of separation and common sense consideration of Cobalt ores have made his milling results the object of much discussion and extravagant notice. In the mill, despite acknowledged imperfections, Mr. Moffett has occasionally saved 92 to 98% of silver contents, a quite unprecedented achievement, although one that cannot be claimed for continuous runs.

A bull jig is to be installed to take the oversize from the trommel. It is not contended by Mr. Moffett that his mill is the perfection of milling practice. With sliming auxiliaries he expects to materially increase his average recovery, but it would be exceeding his expectations no doubt to create a plant that would day after day give him 98% of silver, as was noted a few months ago when 47 tons crushed, gave him 27,350 ozs., valued at \$15,179. As a day's output of the mill



from mine-run rock this is a most creditable, and almost incredible performance. A product from jigs and slimes now represented as averaging 5,000 ozs. of silver to the ton, and from the tables of 1,500 ozs. to the ton and the mill treating 50 tons per day, accentuate the curiosity of technical men as to what Mr. Moffett could accomplish if he had an ideal mill, such as he has in view. I asked him what, in his judgment, would be that ideal, and he courteously volunteered to state the case in *The Mining World* as follows:

#### WET CONCENTRATION OF COBALT ORES.

"There is a very large tonnage of low-grade ore in the Cobalt district that cannot otherwise be profitably handled than by some concentrating system. As a complex ore, being composed principally of smaltite and silver, it is not as difficult to handle as some of the ores now being concentrated throughout the western states where there must be a separation of the various minerals first by concentration and then by some one of the parting processes—usually electrostatic machines or by magnetic separators. The ore of the Cobalt district requires hauled minerals to produce a concentrate only a careful concentration of the commodity for shipment.

"Similarly with the majority of concentrating ore; this ore, to obtain the best results, should begin the actual concentrating process with as coarse a product as can successfully be handled on the jigs. The degree of coarseness desirable may be judged from the manner in which the ore breaks in passing through the crusher and rolls.

"After the coarse separation of the mineral on the jigs, the tailings should be recrushed sufficiently fine to pass through a 14-mesh screen. This product should then be put through a process of classifying along with the fines screened out from the jig feed, after which it should be passed over a system of concentrating tables. From these tables there should be taken a concentrate, a large middling, a tailing rejection and a slime-water recovery. The middling should then be reground fine enough to free the particles of mineral from the gangue and then passed by elevators back to the classifying process to join with the first feed to that process.

"This classifying system should have with it an adequately large flow of water in order that it may carry all the slimes over the last of the classifiers.

"The slimes, along with the slime water recovery from the tables, should be distributed among a sufficient number of settling tanks to thoroughly settle all the slimes to a thickened pulp which should then be treated by slime concentrating tables. It is wise to avoid making any more slime product than can be prevented, as slimes are always the hardest part of the mineral to save.

"A few words on classification will not be out of the way at this point:

"Classification is one of the most valuable points to be considered in the wet method of concentrating ores.

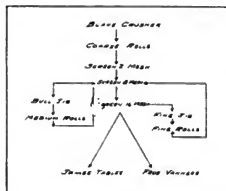
"In many cases classification is overlooked to a great extent, whereas it

should have as much consideration as any process in a mill.

"Without classification no concentrating machinery can make a clean separation and a close saving of the pulp values.

"The system as described will make a good, clean concentrate, and a close saving of the values with the generality of the ore mined in the Cobalt district."

Precedence should be given Cobalt Central milling practice because the company's areas are next in importance to those of the Nipissing, and initial enterprise and success at concentration make them the more conspicuous. About 100 tons of rich concentrates have thus far been shipped to smelters, and another 150



Flow Sheet of Cobalt Central Mill.

tons of sorted ore has been sent away. When it is understood that this is being done in the probationary period of the Big Pete, there is justification for optimism without magnifying abnormal recovery. Besides the Standard mine adjoining the Buffalo, Comagias and Tretheway, has reached the shipping stage and may share the prosperity of its neighbors. A portion of the Standard block is likely to be outside the richly mineralized conglomerate section, but enough of it should be valuable to make regular shipments and contributions to the Cobalt Central Company.

#### Notes on the Tripoli Industry.

The tripoli mined in the United States comes from Missouri and Illinois. The material produced in Union county, Ill., is called silica by the Illinois State Geological Survey, but the suggestion has been made that it has essentially the same origin as the well known tripoli deposits of Newton county, Mo.

The tripoli deposits worked at the present time in Missouri are located near Seneca and Racine, Newton county. They occur in the Boone formation in bodies from 4 to 12 ft thick. The material is a light, even-textured rock, fairly tenacious after drying, but more or less friable when mined. It is extremely porous and light; hence the term "cotton rock," which is sometimes applied to it. No trace of fossils of any kind has been found in the deposits. The material runs over 98% in silica. It is thought to have been derived from a fine, granular, and nonfossiliferous limestone from which the calcareous material has been leached,

leaving the silica in a thoroughly porous condition.

The tripoli is usually massive, with scarcely a trace of stratification, but is divided by various systems of joints into blocks of varying sizes. Chert in lensor balls is commonly associated. After removing a thin mantle of clay, gravel, and residual chert from the tripoli, the material is quarried by the methods described below:

Vertical channels 12 ins. wide are cut to the bottom of the deposit, or to such depth as is desired. These channels are easily made with a light pick of ordinary shape. Where the rock is much cut up by fissures and clay seams the channels are cut along the more prominent of these joints, to lose as little as possible of the dimension stone. A 2-in. hole is then drilled between the ends of the channels, filled with unslacked lime, and tamperably absorption of quarry sap the lime is slacked, swells, and lifts the stone, the steadily increasing pressure having a tendency to loosen up the blocks along the already existing joints, rather than to make new fractures.

The shape and size of the blocks thus obtained depend on the number and attitude of the joints.

The larger blocks of good quality are sent directly to the filter shop. Spalls and pieces not suitable for filters are sent to the dry sheds, to be later ground into tripoli flour. When rock for grinding only is desired, that is to say, when it is too much jointed or for some other reason is unsuitable for filter stones, powder is used instead of lime in raising the rock, as it gives blocks of smaller size and saves some hand breaking before crushing.

Where the rock is not so closely beset with joints and fractures, narrow 2-in. cross channels are cut the length of the handle with a narrow-eyed pick, the eye being no wider than the cutting edge of the pick. In this way pieces of regular dimensions are obtained. Blocks 2 by 2 by 5 ft are as large as are ordinarily desired.

The rough blocks from the quarry are taken directly to the mill and are there uniformly turned into filter stones of various sizes and shapes. These are made on regular turning lathes. Defective blocks, trimmings, and the dust go to the tripoli flour mill. After thorough drying the material is crushed, ground, and bolted. Two grades are marketed, depending on the degree of fineness; the grade known as O. G. (once ground) will pass through a 60-mesh sieve, and that known as D. G. (double ground) will pass through a 110-inch sieve. Three colors of the tripoli flour are made—white, cream, and rose. The material is sacked or barreled and shipped like ordinary flour. This fine material is used almost entirely as an abrasive.

West Africa produced approximately 161,391 fine ozs. gold, valued at \$3,376,937, from Jan. 1 to July 31.

Victoria produced 320,677 fine ozs. gold valued at \$6,628,393 in the first six months this year.

# The Mineral Production of Illinois During 1907.

By F. B. VAN HORN.\*

There was a remarkable increase in the output and value of mineral products in 1907 over that of 1906. The total value in 1906 was \$68,296,908 as compared with \$152,122,648 in 1907. Of the latter figures, however, \$38,842,608 is for pig iron and spelter, which, although actually manufactured in 1906, were not included because the raw material was imported into the state. It has been thought best to include these with Illinois statistics for 1907, since similar products are reported by other states. Including pig iron and spelter for both years, the increase was \$31,200,422, or 25.8%. Without these items the increase was still more remarkable, amounting to \$24,983,132, or 36.5%.

The following table shows the values of mineral output for 1906 and 1907:

	1906.	1907.
Coal.....	\$44,783,062	\$54,687,282
Pig iron (estimated).....	47,128,000	52,228,000
Oil.....	3,275,802	16,432,947
Clay.....	12,782,813	13,351,262
Zinc (estimated).....	5,299,508	6,411,608
Limestone.....	3,176,449	4,352,651
Portland cement.....	2,461,494	2,852,516
Sand and gravel.....	1,043,041	1,367,653
Natural and slag cement.....	188,262	174,282
Fluorspar.....	169,623	141,971
Mineral water.....	77,287	31,760
Lead ore (estimated).....	45,760	45,760
Sandstone.....	19,125	14,296
Pyrite.....	.....	5,590
Total.....	\$120,922,226	\$152,122,618

There was an increase in coal production in 1907 of 9,837,042 tons, the figures for the year being 51,317,146 tons, valued at \$54,687,282, as compared with 41,890,104 tons valued at \$41,763,062 in 1906, an increase of 24.2%.

This large production again advanced Illinois to second among the coal producing states. The increase was due in large measure to heavier demand for coal, and also to the renewed activity of mining after the recovery from the effects of the suspension in 1906. Illinois suffered more from this suspension than did West Virginia, and it is but natural that after the enforced idleness the output should increase in larger proportion. In 1907 Illinois production surpassed that of West Virginia by 3,225,563 tons.

In 1905 the area underlain by workable coal in Illinois was given as approximately 46,000 square miles. In May, 1908, the U. S. Geological Survey published a map by Marius R. Campbell showing the coal areas of the United States, and giving that of Illinois as 35,000 square miles. According to information on this map, the estimated original coal supply of Illinois was 240,000,000,000 short tons. The production for the year 1907 was 51,317,146 short tons, and the total to January, 1908, was, including waste, 968,000,000 short tons, or 0.4% of the original supply. It is interesting to note, in connection with the recent movement toward the conservation of our natural resources, that, as computed by E. W. Parker of the United States Geological Survey, there still remain in Illinois

*Remarkable activity in mineral industry of Illinois. Statistics collected in co-operation with United States Geological Survey.*

*Coal area is 35,000 sq. miles, while original supply was 240,000,000,000 short tons. Miscellaneous products*

coal reserves more than 4,600 times the production of the state in 1907, and, allowing  $\frac{1}{2}$  ton of waste for each ton mined, more than 3,100 times the exhaustion represented by that production.

The Illinois coal production, by inspection districts, for 1907, in order of tonnage, is given below:

District.	Tons.
Tenth.....	8,669,174
Eighth.....	2,578,590
Seventh.....	1,349,554
Ninth.....	6,461,573
Sixth.....	6,024,628
Fifth.....	2,215,019
First.....	3,216,000
Second.....	2,711,177
Fourth.....	2,524,893
Third.....	2,176,102

In addition to the figures shown, there were 25,036 tons mined from local coal banks. This tonnage was not distributed by counties, but lumped together in the total production.

Williamson county, of the tenth district, with 5,697,091 tons, was the largest producing county in the state. Sangamon, of the sixth district, was the next largest producer, with 5,160,042 tons. St. Clair county, of the eighth district, was third with an output of 4,511,879 tons. Macon, of the seventh district, was fourth, with 1,567,270 tons. Madison, of the eighth district produced 3,927,521 tons; Vermilion, of the fifth district, 2,973,253 tons; Saline, of the tenth district, 2,247,842 tons; Fulton, of the fourth district, 2,113,613 tons; Bureau, of the second district, 2,010,762 tons; Grundy and La Salle counties, of the first district, Peoria, of the third, Montgomery and Christian, of the seventh, and Clinton, Franklin, Marion and Perry, of the ninth district, mined over 1,000,000 tons.

Of the 1907 production 29.49% was mined by machines as compared with 25.93% in 1906.

## CLAY AND CLAY PRODUCTS.

The value of the clay products during 1907 was \$13,351,262. This represents an increase over 1906 of \$67,519, or 4.4%. Since sand-line brick is manufactured only in Rock Island county, the value of this product is given with that of other brick.

The increase or decrease of the different products as compared with 1906 is shown in the table below:

	1906.	1907.
Brick.....	\$ 9,836,540	\$ 9,957,721
Sewer pipe and tile.....	1,772,798	2,283,702
Pottery.....	982,807	1,001,766
Raw clay.....	121,272	105,703
Total.....	\$12,753,417	\$13,351,262

\*Including architectural terra cotta and fire brick.

## STONE.

*Limestone.*—The value of limestone produced in 1907 was \$4,333,651 as compared with \$3,476,449 in 1906. This represented a gain of \$857,202, or nearly 25%. Cook county furnished almost half the output, valued at \$2,011,473.

In 1906 the figures for building stone, flagging, curbing and paving were given under the head of dimension stone, and those for railroad ballast, concrete, rubble and riprap, and broken stone were given under the head of broken stone. In order to conform as nearly as practicable with the tables of the United States Geological Survey, these have been separated to a certain extent in the accompanying table, which is given for the sake of comparison:

	1906.	1907.
Dimension stone.....	\$ 318,528	
Stone for road making.....	667,195	
Stone for lime.....	524,118	
Broken stone.....	1,572,251	
Stone for flux.....	284,357	
Other.....	.....	
Total.....	\$3,476,449	
Building stone.....		\$ 199,430
Paving, curbing and flagging.....		188,140
Stone for road making.....		836,922
Lime produced.....		559,305
Broken stone.....		440,672
Railroad ballast and concrete.....		1,618,123
Stone for flux.....		423,315
Other.....		56,324
Total.....		\$4,333,651

*Sandstone.*—The production of sandstone in 1907, as in the previous year, showed a considerable decrease. The output for 1907 was valued at \$14,296, as compared with \$19,125 in 1906.

## SAND AND GRAVEL.

Sand and gravel showed an increase of \$324,612 in 1907 as compared with 1906, a gain of 31%. The total value in 1907 was \$1,367,653, as against \$1,043,041 in 1906.

## OIL.

The most notable increase in Illinois mineral production during 1907 was that of oil, from 4,297,050 bbls in 1906 to 21,281,973 bbls. in 1907. A wonderful showing was made in 1906, when from practically a non-producer in 1905 Illinois took her place as ninth among the oil producing states, with 4,397,050 bbls. The production in 1907 entitles Illinois to third place, Oklahoma and California being first and second.

The average price per barrel declined from 74+ cents in 1906 to 67.7 cents in 1907, the total value of the 1907 output being \$16,132,947.

## GA8.

The gas in the oil district has been utilized to a considerable extent during the year, but the figures are not available for publication.

## CEMENT.

The production of Portland cement in 1907 was 2,036,093 bbls., valued at \$2,632,576. This is an increase of 177,690

\*Illinois State Geol. Survey. Extract from annual report.

bbls. over 1906, when the production was 1,852,403 bbls., valued at \$2,461,494.

The average price dropped from \$1.33 to \$1.29 per bbl. The output of natural and slag cement in 1907 was valued at \$174,282, as compared with \$188,262 in 1906. There were four concerns making Portland cement and two natural cement during the year. One of the natural cement plants also made slag cement. The new Portland plant at Dixon did not begin operations until late in the year.

#### FLUORSAPAR.

During 1907 the production of fluorspar was 25,128 short tons, valued at \$141,971. Complete returns as received by the United States Geological Survey give the 1906 figures as 28,268 tons, with a value of \$109,623. Accepting these corrected figures, there was a decrease of 3,140 tons, \$18,652, in 1907, as compared with 1906.

#### MINERAL WATER.

There were 720,100 gals. of mineral water, valued at \$91,700, marketed in 1907. This is an increase of 145,947 gals., \$14,473, over 1906, when 574,153 gals. were sold for \$77,287.

#### ZINC.

The spelter made at Illinois short tons in 1907 amounted to 56,056 short tons, valued at \$6,614,608. About 298 tons of this was from ores mined in the state.

#### LEAD.

Complete returns for lead production are not yet available, but the figures will probably not be far from those for 1906, when 572 short tons were mined, with an average value of about \$80 per ton.

#### PIG IRON.

There were produced 2,477,768 long tons of pig iron in 1907, with a value of about \$12,228,000. The output in 1906 was 2,156,866 tons, \$17,128,000.

#### PYRITE.

In 1907 pyrite was produced in Vermilion county to the amount of 2,900 long tons, with a value of about \$5,700.

### Grindstones and Pulpstones.

The value of the grindstones used and pulpstones produced in the United States in 1907 amounted to \$896,022 and was the largest ever reported to the United States Geological Survey, exceeding by \$14,195 the valuation of the product in 1904, hitherto the maximum, and being \$151,128 in excess of the value of the output in 1906. Five states—Ohio, Michigan, West Virginia, Montana and Missouri—contributed to the production, but the value of the Ohio product was 85 per cent of the total.

The value of the imports of pulpstones and grindstones has shown a steady increase up to 1907, when there was a sharp decline—from \$131,136 in 1906 to \$111,495 in 1907. These imports consist principally of pulpstones and a few grindstones for use in the glass and optical trades, the material being obtained chiefly from Newcastle-upon-Tyne and from Wales and Scotland.

### Silver and Gold in California.

BY CHARLES G. YALE.

The following statement shows the production, by counties, of gold and silver in California in 1907, as reported from the mines to the United States Geological Survey.

Compared with the mine production of 1906, the 1907 figures show a decrease of \$2,001,324 in value of gold and of \$66,182 in silver, a total falling off of \$2,067,506.

### Acacia for Mining Timber.

BY ERNEST VOLLMER.\*

During the 10 years of German occupation of the Kiaochow colony in China, one of the active branches of the government has been the forestry department. After experiments with a large variety of trees, to determine what would grow best and quickest here, the acacia was chosen as the tree to be used most in the afforestation of the bare hills surrounding Tsing-

#### PRECIOUS METAL OUTPUT OF CALIFORNIA.

County.	Gold.		Silver.		Total Value.
	Fine Ounces.	Value.	Fine Ounces.	Value.	
Amador	102,370.21	\$ 2,176,182	29,177	\$ 13,510	\$ 2,129,497
Butte	154,413.28	3,286,840	17,387	8,867	2,786,947
Calaveras	53,114.49	1,097,974	82,164	54,420	1,152,891
Colusa	35.61	731	12	3	742
Del Norte	42.47	878	3	2	881
El Dorado	15,140.19	319,177	3,486	2,391	321,458
Fresno	116.15	2,401	39	26	2,427
Furness	1,940.27	49,189	352	214	49,273
Inyo	2,769.67	57,211	67,333	44,440	101,651
Kern	42,311.85	878,798	159,333	86,033	964,831
Los Angeles	542.45	11,214	16,767	11,066	22,280
Mariposa	613.53	13,303	767	596	13,899
Merced	19,615.96	405,498	6,288	4,150	409,648
Monterey	29.76	822	15	10	832
Mono	18,574.63	383,971	45,147	29,787	413,758
Nevada	101,390.16	2,162,083	26,522	17,605	2,179,588
Placer	25,354.10	532,712	5,088	2,358	535,070
Plumas	10,611.30	219,235	1,436	948	220,183
Riverside	183.57	3,836	40	26	3,862
Sacramento	38,263.22	799,323	3,982	2,024	801,347
San Bernardino	1,675.95	35,676	123,211	81,339	117,015
San Diego	360.64	7,455	53	35	7,490
San Luis Obispo	15.29	316			316
Sierra	38,312.85	791,997	560,296	370,211	1,162,208
Sierra Blanca	25,108.86	533,994	3,971	2,621	536,615
Shasta	19,254.07	398,017	4,602	3,037	401,054
Stanislaus	162.13	3,364	42	28	3,392
Trinity	25,895.91	535,316	3,635	2,359	537,675
Tuolumne	39,032.63	846,876	8,453	5,453	852,329
Yuba	85,467.51	1,766,170	9,374	6,187	1,772,527
Total	809,213.52	\$16,727,528	1,138,858	\$761,646	\$17,479,574

The value of silver in 1907 is taken at 60 cents per fine oz. and of gold, \$20.67 per oz.

### Treating Silver Ores in Mexico.

Silver metallurgy in Mexico is in a transitory stage, and from all accounts it seems that agitation by compressed air in vertical tanks is now specially favored and allows of the treatment of even 40-mesh material with low cost of power. These tanks are variously called Pacheca tanks, because first installed in Mexico, or "Brown" tanks, after their originator, F. G. Brown, of Waihi, New Zealand. New tanks are 13 ft. diameter and 55 ft. high.

Time of treatment by agitation also is increasing and varies from 25 to 150 hours, and one plant has proposed, instead of selling its concentrates, to slime and treat them by air agitation in strong cyanide solution, experiments having given satisfactory results.

There is an increased use of suction filters of various types, as a result of the comparatively small proportion of solution removed at each decantation and consequent imperfect washing and long time of treatment.

India produced 287,389 fine ozs. gold valued at \$5,910,337 in seven months this year.

Great Britain imported 3,467,235 tons iron ore in seven months this year.

tau. The reasons for this selection were twofold: A tree was wanted to make shade and cover the hills as soon as possible, regardless of its value, and the poor soil precluded the use of a variety which would not grow in almost any sort of earth. While these acacias (*robina pseudoacacia*) have been growing, more valuable woods of all sorts, adaptable to the climate, were being constantly planted.

In the winter 1906-7 acacias planted in 1902 and 1903 were cut for the first time. All timber up to 5 centimeters (1.97 in.) diameter was sold to the Shantung Mining Co. for mining timber. This company has made extensive experiments with the wood, and now reports that for mining purposes the acacia is as good as or better than the pine and cedar varieties now being imported from Japan. The demands of the company are growing from year to year, and are now at 20,000 cu. m. (706,290 cu. ft.) per annum.

With the satisfactory results of these tests the German government has decided to go heavily into the acacia raising business, as there are large tracts of land apparently worthless for anything else. The acacias also have many other good points. Unlike the pines, they are not subject to disease or ravages by insects; furthermore the entire cost of production is covered by the sale of refuse twigs, etc., to the natives for firewood, while the mining company has agreed to take all timber offered at about \$5 per cu. m. (35,314 cu. ft.).

\*American vice-consul at Tsingtau, China, China.

# Shop Talks, No. 2—American Spiral Pipe Works.

From a little shop at Twenty-second place and Lincoln street, in 1900, to a magnificent plant at Forty-eighth avenue and Fourteenth street, covering six acres of a 20-acre tract, with nearly 300,000 ft. of floor space, is the history of the American Spiral Pipe Works of Chicago.

Like thousands of other manufacturing industries its beginning was of the smallest and its years were beset by financial difficulties, and other setbacks, includ-

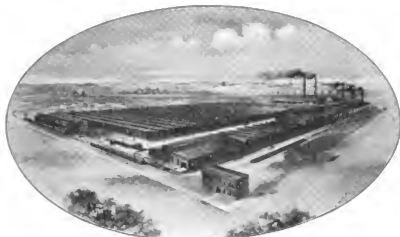
By GEO. E. EDWARDS.

machines were added and such other equipment was installed as seemed sufficient for all purposes for years to come.

The business, however, continued to grow to such an extent that in 1907 larger floor space was found to be necessary. The company was then incorporated with a capitalization of \$100,000 and with Thos.

ties were well looked after and are all that could be desired; the yards are equipped with powerful traveling cranes, running the full extent of the plant and to its tracks, the product of the company being loaded by them onto the cars. The incoming freight is distributed to the various warehouses and shops in a similar manner.

The magnitude of the pipe industry is as little known as is the manufacturing end of it understood. There is so much of interest in the manufacture of pipe, that, considering the immensity of the in-



Birds-eye View of Plant of the American Spiral Pipe Works.

ing fires. Instead, however, of being discouraged, these troubles only induced greater effort on the part of the members of the firm, finally resulting in the placing of their business at the top, in fact making it one of the largest of its kind in the world.

With three machines, patented by Mr. J. Hall Taylor, for the manufacture of the Taylor spiral riveted pipe, and making pipe in sizes only from 3 to 16 in. in diameter, the American Spiral Pipe Works was launched under a partnership agreement by Messrs. Thos. Kane, J. Hall Taylor and L. W. Hogg. After surmounting the usual difficulties met with

Kane as president, J. Hall Taylor secretary and L. W. Hogg as treasurer and general manager. A site was secured at

the corner of Forty-eighth avenue and Fourteenth street, where with 20 acres at its disposal the company erected a

dustry, there is probably no other the details of which are so little known.

Pipe lines for the conveying of waters have been in use for ages, wood pipe being of the earliest commercial importance.

The past few years, however, have witnessed a wonderful advancement in hydraulic water development, necessitating a pipe of sufficient strength to withstand the severest strains. Advantage is now taken of the mountain streams and



Forged Steel Flange.



A Section of Taylor's Spiral Riveted Pressure Pipe.

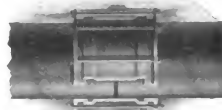


Testing Rigidity of Taylor's Spiral Riveted Pipe.

generally by new enterprises, the business at the end of the first year, had so grown that a larger plant was found to be necessary and quarters were secured at 1173-1201 South Paulina street. Additional

model plant and equipped it with additional machines and such other equipment and labor-saving devices as made the handling of its product almost entirely automatic. The company's shipping facili-

torrents and a portion of their immense power, hitherto wasted, is converted into practical use, while arid lands are reclaimed by irrigation. All through the mining districts of the west the mountains are interwoven with pipe lines which convey water for hydraulicking purposes and to



Forged Steel Bolted Joint.

the mining camps for milling and domestic purposes, to the valleys for irrigation, or lead to water wheels for supplying power.

The company's product has played an important part in the building up of the mining industry in this and foreign countries. An important installation of the Taylor pipe is that for the Homestake Mining Co., at Lead, S. D., where 26,000 ft. of asphalted pipe was installed in sizes from 16 to 28 in. This water line works under a head of 482 ft., being approximately 208 lbs. pressure per square inch. For the Yukon Gold Co., on lower Bonanza creek, Alaska, nearly 10,000 ft. of asphalted pipe was installed in sizes from 14 to 26 in. was installed. The maximum head below the ditch from which the smaller sizes of pipe run is 600 ft. The larger sizes of pipe run from an elevation of about 2,210 ft. to 1,900 ft. where it empties in a large ditch. The Newhouse Mines & Smelters Co., Frisco, Utah, has had installed an 8-mile water supply line of 12 and 14-in. pipe, working under a 250-lb. pressure. For the Beaver River Power Co., Beaver, Utah, 12,000 ft. of pipe was installed, made up of 31, 32 and 30-in. pipe. This line was installed 60 miles

Smelting Co., Globe, Ariz., a water supply line and an exhaust steam line.

In the manufacture of Taylor spiral riveted pipe a strip of sheet steel is fed into the machine and is wound into a helical shape with one edge overlapping the other for riveting the seam. The sheet is so drawn and formed that a metal to metal contact is obtained in the spiral seam, stretching the steel on the outer

continuous piece, and is cut to any desired length. Due to its mechanical construction, the seam is the strongest part of the pipe, which has been demonstrated by hydraulic tests for bursting pressure.

A great innovation in pipe work in recent years was effected by the company in the introduction of forged steel flanges, which it is possible to rivet absolutely tight and securely to the pipe. All danger



Spiral Pipe Line for Newhouse Mines & Smelters Co., Frisco, Utah.

from a railway station at an elevation of 8,000 ft. It contains what is probably the largest all-steel couplings ever made. The line installed for the Timberlake Mining Co. has a length of 28,000 ft. and is made up of 18, 20 and 22-in. pipe. The elevation of the intake is 7,000 ft., and of the outlet 6,800 ft. The country is very rough, having no less than 12 different elevations. Among other important installations is that of the Peninsular Hydraulic Mining Co., Nome, Alaska, for supplying water for hydraulic giants on Osborne creek; Round Mountain Hydraulic Co., Round Mountain, Nev., for hydraulicking purposes; Buckskin Mountain Copper Co., Fredonia, Ariz., water supply line for mill purposes; Old Dominion Copper Mining &



Pipe Line for Homestake Co.'s Hydro-Electric Generating Station, Lead, S. D.

lap slightly offset, in order that the pipe will be made more nearly smooth on the inside. The riveting is done cold by compression or squeezing under enormous pressure and not by percussion or hammering, thus insuring complete filling of the rivet holes with slight countersink. The pipe comes from the machine in a

of breaking from rough handling in transportation, connecting, etc., is thus entirely eliminated.

The pipe is protected by an asphaltum or mineral rubber coating made from gilsonite, mined in the state of Utah, which is practically a pure hydrocarbon, and is claimed to be one of the best known pre-



Spiral Pipe Nested for Export Shipment.

servatives for steel. The physical properties of this material are such that it does not become brittle, crack or flake in cold weather, nor melt or run in the hottest summer sun. The pipe is submerged in a bath which is kept at a temperature of 400 degrees and then drained in a vertical position thus giving it a thick, even protective coating inside and out.

Taylor spiral riveted pipe is made in different gages up to one-quarter inch thickness and is furnished in any length up to 30 ft. for asphalt coated pipe, and 24 ft. for galvanized pipe. It is made in diameter from 3 to 40 in.

In addition to the Taylor spiral riveted pipe, the company manufactures a full line of cast iron fittings, which are especially adapted for light pressures. These fittings are equipped with flanges in accordance with standard pipe drilling and are furnished either black or galvanized. Special shaped sheet steel fittings are also furnished of any desired shape. The company also manufactures hydraulic mining giants, pressure and exhaust valves, slane gates, large sized strainers and foot valves.

### A Coal Hoisting Record.

The Superior Coal Co. of Gillespie, Ill., under the management of J. W. Miller, operates three shaft mines designated as Nos. 1, 2 and 3, none of which have been in operation more than four years, but each produces a daily output upward of 3,000 tons. Two days' work at each mine during the week of Aug. 26, gave the following results:

Mine.	Tons.
No. 1, August 24	3,270
No. 1, August 25	3,274
No. 2, August 26	3,019
No. 2, August 27	3,015
No. 3, August 28	2,601
No. 3, August 29	3,619

Total for three mines, two days' work at each ..... 18,800

This is an average of 330 tons per day of eight hours for each mine, all of which are about 350 ft. deep and equipped with 24" by 24" first motion hoisting engines with cylindrical drums 7 ft. diameter, built by the Litchfield Foundry & Machine Co., Litchfield, Ill.

### Coke Making in Illinois.

Illinois ranked tenth among the coke producing states in 1907. The total output for the year amounted to 372,697 short tons, valued at \$1,737,614, as against 268,683 tons, \$1,265,162, in 1906, and 10,397 tons, \$27,681, in 1905.

The prominence of Illinois as a coke manufacturing state is the result of the operations of the 160 Semet-Solvay ovens at South Chicago. The coal used at this plant is drawn, however, not from the mines of Illinois, but from those of Fayette county, W. Va. A plant which made coke in Belgian ovens from Illinois coal was in operation during the year at Equality. At the close of 1907 the Illinois Steel Co. had under construction at Joliet 280 Koppers regenerative by-product ovens, and it is expected that these ovens will be in operation before the close of 1908.

### Ohio's Coke Industry.

BY EDWARD W. PARKER.\*

Although Ohio ranks fourth among the coal producing states it has not attained great prominence as a coke producer, partly because much of the coal mined in the state makes an excellent fuel in its raw condition, but partly also because it has to compete with the higher grade coking coals of Pennsylvania and West Virginia.

The operations of the Rothberg by-product recovery plant at Cleveland, which was in full blast during 1905, 1906 and 1907, and the Otto-Hoffman plant at Hamilton, near Cincinnati, together with an increased production of bechive coke at Leontonia, have, however, brought the total production of Ohio during the last three years to an important figure, although the output in 1907 was less than that reported in 1906.

The production for 1907 amounted to 250,334 short tons, valued at \$819,262, as compared with 293,294 tons, \$1,013,248, in 1906. The Otto-Hoffman plant at Hamilton was idle from July 6 to December 10, owing to damages occasioned by a storm, and this fact probably accounts for the slight falling off in production in 1907.

Of the eight coke making establishments in the state, one, with 120 ovens, was idle throughout the year. This plant has been idle for the last three years.

Ohio was the only state in which the average price of coke was lower in 1907 than in 1906, the price declining from \$3.45 in the earlier to \$3.03 in the latter year.

The greater part of the coal used in coke making in Ohio is unwashed run-of-mine, although in 1907 the proportion of washed coal was larger than in previous years. Of the 376,759 tons of coal converted into coke in the state in 1907, unwashed run-of-mine amounted to 208,637 tons; 45,712 tons were washed run-of-mine, 36,511 tons were unwashed slack, and 25,899 tons were washed slack. The washing of the run-of-mine coal at Hamilton probably accounts in part for the increased percentage yield of coal in coke—from 67.2% in 1906 to 71.8% in 1907.

### Pumice in United States.

The pumice produced in the United States in 1907 amounted to 8,112 short tons, valued at \$31,818, according to the United States Geological Survey. This was a decrease of 4,688 tons from 1906, but there was a large increase in value, due in part to increased cost of handling the material at the mines and of getting it into cars.

The value of imports in 1907 amounted to \$85,617. This is \$26,618 less than 1906.

In July Rhodesia produced gold 54,237 fine ozs.; silver, 28,131 ozs.; lead, 115 tons; copper, 8 tons; coal, 9,158 tons; chrome ore, 617 tons; asbestos, 5 tons.

Gold exports from British Guiana from Jan 1 to July 22 amounted to 33,952 ozs., valued at \$609,313.

\*Extract from Mineral Resources of U. S. for 1907.

### New Publications.

Publishers are invited to send all books and pamphlets, treating of subjects relating to mining, metallurgy, chemistry and kindred industries, to the Review Editor of The Mining World. Whenever possible state selling price of publications.

*Annual Report of the Department of Mines of West Virginia for the Year Ending June 30, 1907.* James W. Paul, chief of Department of Mines, Charleston, W. Va.; State Printers. Pages, 511; with map.

*First Report of Bureau of Labor Statistics: Industrial Accidents in Illinois for the Six Months Ending Dec. 31, 1907.* David Ross, secretary. Springfield, Ill.; State Printers. Pp. 150.

*Geological Survey of New Jersey: Annual Report of the State Geologist for the Year 1907.* By Henry B. Kimmel, state geologist. Trenton, N. J.; State Printers. Pp. 102; with map and illustrations.

*Tables and Other Data for Engineers and Business Men.* Compiled by Chas. E. Ferris. Knoxville, Tenn., 1908; University Press. Pp. 250. Price, 50 cents.

This is the eleventh edition of a vest pocket book which is invaluable to engineers, for it contains among much other useful information, a very carefully arranged four place logarithm table.

### New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 30 cents with the title, number, and date of patent to The Mining World. Remittances may be made by coin, stamps, or postoffice money order.

#### PATENTS WEEK SEIT, 1, 1908.

Method of Rendering Electrolytic Copper Homogeneous. M. A. Juhn and E. L. Jossel, Leveillé-Borrell, France. (897,271; filed Dec. 7, 1907.)

Electric Cable Clamp. E. W. Muller, assignor to Hubert Keating, Brooklyn, N. Y. (897,360; filed Feb. 8, 1908.)

Electric Locomotive. E. A. Sperry, Brooklyn, N. Y. (897,312; filed Feb. 7, 1908.)

Mining Machine. Wm. O. Stark, Chicago, assignor to E. C. Austin. (897,313; filed Dec. 18, 1907.)

Drill Chuck. T. R. Almond, Yonkers, N. Y., assignor to the T. R. Almond Mfg. Co., Brooklyn, N. Y. (897,325; filed Dec. 20, 1907.)

Rock Drill. R. H. Anderson, Germiston, Transvaal. (897,336; filed Feb. 6, 1907.)

Method of Drying Air for Blast Furnaces. David T. Day, Washington, D. C. (897,354; filed Jan. 2, 1908.)

Automatic Bottom-Dumping and Self-Cleaning Bucket. H. G. Ferris, Leavenworth, Kas. (897,361; filed Sept. 3, 1907.)

Centrifugal Pump and Water Wheel. Jos. Hykl, Dayton, O., assignor to the Dayton Hydraulic Machinery Co. (897,387; filed Oct. 11, 1907.)

Mining Machine. Goro Santa, San Francisco, Cal. (897,415; filed Sept. 12, 1907.)

Dump Car. H. T. Herr, Denver, Colo., assignor to the Herr Dump Car Co., Denver, Colo. (filed May 4, 1906.)

High-Lift Centrifugal Pump. Carl Lager, Indianapolis, Ind. N. Y. (897,436; filed June 7, 1904.)

Dump Car. Richard H. Stevens, Muncie, Ind. (897,496; filed Sept. 12, 1907.)

Miner's Cap and Lamp. L. W. Cogswell and J. D. Abel, Taylorville, Ill. (897,588; filed Jan. 21, 1908.)

Lubricator. Robert Davidson, Detroit, Mich., assignor to Michigan Lubricator Co. (897,595; filed July 23, 1906.)

Oil Burner. J. C. Fitzsimmons, Oakland, Cal. (897,611; filed April 2, 1908.)

# Current Literature on Mining, Metallurgy, Etc.

*Zacatecas, a Famous Silver Camp of Mexico.* Claude T. Rice. Reviews the early history of this old camp, which the writer claims is one of the most backward of the famous old camps of Mexico. Few veins have been developed at depth and as only one mill is now running in the district the silver output is small.—E. & M. J., Aug. 29, 1908. Pp. 6; illus. 20 cts.

*Mining and Smelting on the Shasta Copper Belt.* Al. H. Martin. Presents the important features of operations on this belt, the leading properties of which are located on the west side of the Sacramento river, while the east side is noted for its deposits of copper and precious metals.—The Mining World, Aug. 29, 1908. Pp. 2½; illus.

*Mineral Prospects Around Death Valley.* Robert E. Rinehart. According to the writer mining activity in the vicinity of Death Valley has sunk back to the dead-level of the lonesome days following the farewells of the 20-mule borax teams. The inhospitable region is practically abandoned to chuck-a-walla, sidewinders and a few burro-men.—M. & S. P., Aug. 29, 1908. Pp. 2; illus. 20 cts.

*The Pyritic Origin of Iron Ore Deposits.* H. Martin Chance. Within the last few years, geologists who had rejected the sedimentary theory of the origin of iron ores, and taught by master minds of the preceding generation, have, by reason of the evident stratification of the Mesabi deposits, found it necessary to abandon the theories of secondary origin. An examination of the evidence for and against the theory that ore bodies are the result of the decomposition of pyrite.—E. & M. J., Aug. 29, 1908. Pp. 3; 20 cts.

*The Auriferous Deposits of India.* Dr. Malcolm MacLaren. The schist belt of Kolar is about 50 miles in length. The fundamental granite-gneiss rocks are separated into a grey gneiss, an older porphyritic granite, and a younger intrusive granite.—Mg. Jnl., Aug. 29, 1908. Pp. 2; illus. 20 cts.

*Chemical Control of Coal Washers.* Randolph Bolling. Gives methods of sampling preliminary to laboratory and physical tests. Washery determinations are also given where a calcium chloride solution is used.—E. & M. J., Aug. 29, 1908. Pp. 3; illus. 20 cts.

*Dredging in the Yukon.* T. A. Rickard. The opinion obtains even among well informed engineers that dredging in the Yukon is at best a costly experiment. Describes the operations of the first dredge working in that section and also present day operations.—M. & S. P., Aug. 29, 1908. Pp. 4; illus. 20 cts.

*Modern Developments in the Metallurgy of Lead and Zinc.* A. Selwyn Brown. A review dealing primarily with base metals, but the writer leads up to the important conclusion that as these almost always carry recoverable amounts of gold and silver, there is a further important activity at work multiplying the world's store of the precious metals and hastening

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

In ordering, give date of *The Mining World* in which the article has been mentioned. All orders are payable in advance.

the economic effects which such increase must produce.—Engrng. Mag., Sept., 1908. Pp. 11; illus. 35 cts.

*Cyanidation of Silver Ore in Mexico.* W. A. Caldecott. This is a reply to the discussion of the writer's paper read before the Chemical, Metallurgical and Mining Society of South Africa.—M. & S. P., Aug. 29, 1908. Pp. 2½; 20 cts.

*Metamorphic Ranges in Sonora, Mexico.* F. J. H. Merrill. Is a brief description of the mountains of Sonora which, as a rule, consist wholly or in part of volcanic rocks, although there are some metamorphic ranges which present a special type of mineralization.—M. & S. P., Aug. 29, 1908. 60 words. 20 cts.

*Development of Nova Scotia's Mineral Resources.* Arthur S. Barnstead. In this country the government owns all the mines but does no mining. Leases are easily obtained and at a low cost. Scientific exploration is encouraged and the field is open to all.—The Mining World, Aug. 29, 1908. Pp. 1½.

*Rock Pressure and Metamorphism.* H. M. Chance. This subject, according to the writer, does not seem to have received the attention nor to have been given the prominence that its importance merits; nor has the possible presence of enormous stresses in any or all parts of the lithosphere been sufficiently emphasized.—M. & S. P., Aug. 28, 1908. Pp. 3; 20 cts.

*Coal Maps and Models.* T. S. Harrison and H. C. Zulch. A description of different models that have been used for representing the workings of mines in court proceedings.—M. & M., Sept., 1908. Pp. 6; illus. 25 cts.

*Mineral Resources and Mining Laws of Peru.* The mineral resources of Peru include gold, silver, copper, lead, mercury, tin, bismuth, zinc, iron, cobalt, coal, etc.—Mex. Mg. Jnl., Sept., 1908. Pp. 3; illus. 20 cts.

*Simple Forms of Coal and Ash Conveyers.* Warren O. Rogers. Descriptions of several types, some hand-controlled and others requiring machinery, showing how they are constructed and operated.—Power, Sept. 1, 1908. Pp. 4; illus. 20 cts.

*The Correlation of the International Strata.* Horace F. Evans. This is the fourth of the series of instructive articles on this subject and deals with the strata of the Rocky mountains proper, which contains horizons ranging upwards from

the lower to the upper and including the middle Cambrian. The official classification of the strata of the Nickel Plate beds is also given.—The Mining World, Aug. 29, 1908. Pp. 1½.

*"Moisture" and "Expansion" Packings.* W. E. Sanders. Gives the causes responsible for their adoption; how rubber packing is made, from gathering sap to the completed product; how developed.—Power, Sept. 1, 1908. Pp. 2½; illus. 20 cts.

*Economy in Gasoline Engine Operation.* P. F. Walker. Presents the conditions which make for the most economical results; ratio of air to fuel in the explosive mixture the most active variable.—Power, Sept. 1, 1908. Pp. 3; illus. 20 cts.

*The Silberberg Mines in the Bazarion Forest.* H. B. Pulsifer. Deposits of iron sulphides have been worked almost continuously for some 800 years. The material excavated is relatively small and in the earlier times ore was loosened by fire and water.—The Mining World, Aug. 29, 1908. Pp. 1; illus.

*New Byproduct Coke Plant at Joliet.* Installed at the works of the Illinois Steel Co., being the first installation of Koppers ovens in America. Steel and concrete construction.—Ir. Tr. Rev., Sept. 3, 1908. Pp. 6½; illus. 20 cts.

*Ontonagon Mines, Past and Present.* Robert H. Mauerner. The finding of the "Lake" lode has caused increased activity in a section where spasmodic efforts and bad management tended to create the belief that there was not the material that makes for dividend payers. Activity traceable to remarkable find made on "Lake" lode.—The Mining World, Aug. 29, 1908. Pp. 2.

*Fluorspar in Iron and Steel Metallurgy.* Notes the rapidly increasing use in steel plants and foundries as a flux. Gives the source of the American product and method of mining.—Ir. Tr. Rev., Sept. 3, 1908. Pp. 2½; illus. 20 cts.

*The Predetermination of Processes for Ore Reduction.* H. P. Dickinson. Shows the necessity of determining the process best adapted to an individual ore and of solving the special problems presented.—Mg. Sci., Sept. 3, 1908. Pp. 2½; illus. 20 cts.

*The Beach Placers of the South Pacific Coast.* C. D. Irvine. Describes the vast accumulations of black sand carrying gold, platinum and other values found on the Pacific coast and presents the difficulties that have been and are being experienced in extracting these values commercially.—The Mining World, Aug. 29, 1908. Pp. 1½.

*Zinc Consumption and Preparation.* Mark R. Lamb. Notes the great variation in the amounts of zinc used per ounce of bullion precipitated at various plants and under varying conditions.—Mex. Mg. Jnl., Sept., 1908. 600 words. 20 cts.

## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as new items of sales made, and illustrated descriptions of new inventions or improvements.

### The Jeffrey Crab Locomotive.

The Jeffrey Manufacturing Co., of Columbus, Ohio, has recently added to its line of electric mine locomotives, a new type of gatherer known as the Jeffrey crab locomotive. The gathering locomotive commonly used is provided with a reel of flexible insulated conductor which enables it to enter the rooms for the purpose of delivering empty mine cars to the

comes derailed or the motorman fails to throw off power until the car bumpers strike those of the locomotive. Without this friction arrangement the cable would, in such cases, break, or serious injury would result to the gearing or to the motor itself.

The motor which actuates the crab being entirely separate from the locomotive motors, is controlled by a separate starting box, and when the car approaches the

The arrangement is such that the cable may be paid out from either end of the locomotive. Ordinarily, however, it is more convenient to take the cable out past the motorman, as that end of the locomotive is then opposite the room mouth, and the motorman can watch the light carried by the trip rider, and can see him signal to start winding. He can also watch the car to better advantage as it takes the switch, and can stop instantly if it should become derailed.

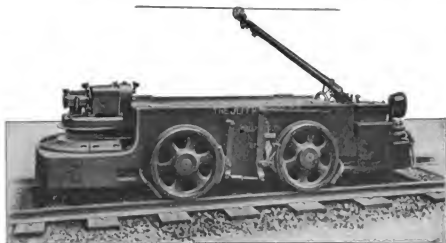
One great advantage claimed for the crab locomotive is that, except where there are rooms driven to the rise at so great a pitch that the cars cannot be pushed into them by hand, it may replace animal haulage at once without making any changes in the tracks or conditions in the rooms.

When the rooms are driven to the rise and it is necessary for the locomotive to enter them in order to push the empty cars to the working places, a gathering locomotive, many types of which are made by the company, is necessary; as ordinarily it is impracticable to use the crab device for hauling cars into rooms.

### Tracy Multiple Jaw Crusher.

The Blythe-Tracy Co., recently incorporated, has acquired by purchase all rights and titles to patents and applications for patents of the Cochran multiple jaw crusher formerly manufactured by the New Century Mill & Reduction Co. The crusher has been entirely remodeled and is now made with heavy steel wearing parts. It is being placed on the market as the Tracy multiple jaw crusher, the units consisting of from two to six jaws, and is driven by individual eccentrics set on shaft each at a variance of 90 degrees apart.

The company has also taken over the exclusive manufacture and sale of the Stebbins dry ore concentrators, classifiers



Jeffrey Crab Locomotive (Front View).

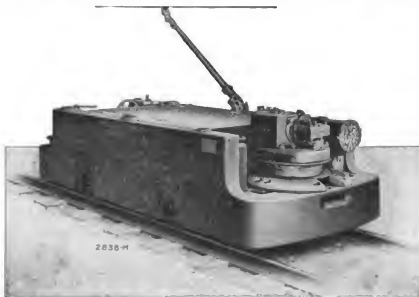
working places, and for hauling out the loaded cars. When the rooms are driven to the dip on steep grades, however, it is difficult for a locomotive which has to enter the room, to work efficiently against the grade. Again, where the tracks are practically level and the cars are not heavy, it is found economical to push the empty into the room by hand, so that mechanical means are required only for hauling out the loaded cars.

The advantages of employing, in such cases, a locomotive capable of pulling out the loaded cars without entering the rooms, has prompted the Jeffrey Mfg. Co. to bring out this crab locomotive, so named from a small winding drum or crab which is mounted on the forward end of the locomotive. On this crab is wound 350 ft. of  $\frac{3}{8}$  in. flexible wire cable which is used for pulling the loaded cars from the rooms and out onto the entry tracks.

The crab device is made as compact as possible, to avoid crowding the rest of the locomotive equipment. It consists of a cast-iron drum upon which a steel cable is wound. This is mounted on a vertical axis and is contained in a frame, the top of which supports the motor which is connected by suitable gearing and a friction clutch to the drum. The motor drives this gearing through a worm and worm wheel, so that when it stops, the gearing is locked against further motion. The drum is driven by the gearing through a friction clutch which acts not only as a smooth starting device for the cars, but also as a safety device in case a car be-

comes derailed or the motorman starts the locomotive ahead. As it advances past the switch points, the car follows and runs out upon the entry tracks without either the locomotive or the winding of the crab being stopped.

The crab may be stopped when the car



Jeffrey Crab Locomotive (Rear View).

strikes the locomotive, but the locomotive need not stop until the room is reached from which the next load is to be hauled. Then the trip rider uncouples the cable and drags it into that room for the car.

and dry placer concentrators. Other specialties handled by the company include the Tracy all-steel stamp mill, Tracy classifying jigs and Tracy electrical copper converter. The company is also



prepared to furnish metallurgical and mechanical engineering and complete equipment for mines, mills and smelters.

T. H. Tracey, formerly manager for Allis-Chalmers Co., is president; W. S. Hancock, vice president; J. M. Myrhe, formerly secretary and general manager of the F. M. Davis Iron Works Co., Denver, Colo., is secretary and treasurer. F. I. Arnold, formerly mechanical engineer for the Traylor Engineering Co., will be the mechanical engineer for the new com-

pany, since when a number of important improvements have been made.

**Oil and Grease Cups.** The D. T. Williams Valve Co., Cincinnati, O. Booklet; illustrated.

In order to transmit power effectively and economically and to successfully allay friction it is essential that a first-class lubricant be used. In addition to this, the device intended for conducting the lubricant to the bearing must be of substantial

## Industrial Notes.

H. S. Palmer, representing mining and other machinery and supplies has opened an office in the Federal Title & Trust building, Beaver Falls, Pa.

The Boston Gas Producer & Engine Co., Cambridge, Mass., gas engines, have been incorporated with \$100,000 capital stock. F. F. Stockwell, Somerville, Mass., is president and treasurer.

Crocker-Wheeler Co., Amper, N. J., has established a branch office in the Gumbel building, Kansas City, Mo., with A. W. Paine in charge, for the sale of Crocker-Wheeler motors, dynamos, transformers, switchboards, etc.

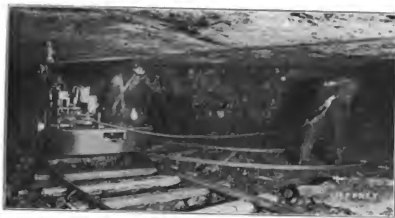
The Lane Slow Speed Chilian Mill Co., Los Angeles, Cal., reports having sold mills in July and August to the Emma L. Mining & Milling Co., Wadsworth, Nev.; Venable Bonding & Leasing Co., Boise, Idaho; Drazno Mining Co., Los Alamos, Mexico, and Golden Surprise Mining Co., Butte, Mont.

W. A. Desborough, formerly with the Fulton Iron Works, San Francisco, Cal., has become associated with the Machinery & Equipment Co., San Francisco, and will assume charge as manager of the company's Los Angeles branch, 310 Lanker-shim building, Los Angeles. The company will deal mostly in second-hand mine and railway equipment.

Among the many improvements that are being made by the Tennessee Coal, Iron & Railway Co., at the Ensley, Ala., plant since passing into the hands of the United States Steel Corporation, is the providing for a supply of soft, clear water for boiler feed. A contract has just been entered into with Wm. B. Scaife & Sons Co. of Pittsburgh, Pa., to remodel the present water-softening and purifying system and convert it into a "We-Fu-Go" system (intermittent type), with a capacity for 35,000 hp. of boilers.

An initial shipment of water-cooled power transformers, forming part of an ultimate equipment of 36 transformers, aggregating 10,530 kw. for the United States Reclamation Service in connection with the Salt River, Arizona, irrigation project, has recently been made by the Wagner Electric Manufacturing Co., St. Louis, Mo. The specifications for these transformers were issued last July, and the contract was awarded to this company under severe requirements as to insulation, operating characteristics, etc., and also under rigid stipulations as to prompt delivery.

Walter D. Carpenter & Co., 39 Cortlandt street, New York city, has recently placed on the market a new lubricant called "Graphlo." The manufacturers claim that this product is of pure crystalline flake graphite, ground to an impalpable powder and free from grit, clay or other impurities. The claim is also set forth that it can be freely used, mixed with any lubricating oil, will stay mixed in can or oil cup, and will make the desirable qualities of graphite available for all places where a lubricant is required, with the result of reduced friction and saving of power.



Jeffrey 5-Ton Crab Locomotive in Operation.

pany. These with Oscar Lawler form the incorporators.

## Trade Publications.

**Expanded Metal.** Northwestern Expanded Metal Co., Old Colony building, Chicago. Booklet.

Under the caption "Expanded Metal Information" suggestions are given as aids to the compiling of specifications for reinforced concrete structures and refers to the advantages of Northwestern metal reinforcing.

**Pulsator Classifier.** The Denver Engineering Works Co., Denver, Colo. Bulletin No. 1039; illustrated.

Is devoted to a description and illustration of the Richards pulsator classifier which is designed for a proper classification of crushed ores for subsequent treatment upon concentrating tables, or similar machinery. For this classifier the manufacturers claim that by its use the amount of mineral in the final tailings is almost exactly halved as against previous practice.

**Cool Blasting Appliances.** Star Electric Fuse Works, Wilkes-Barre, Pa. Booklet. Pp. 18; illustrated.

The Star electric safety fuses are fully described and the advantages and great safety in their use are clearly presented. Much information of value is given in connection therewith.

**Concentrator.** Colorado Iron Works Co., Denver, Colo. Bulletin 5-G. Pp. 12; illustrated.

Describes and illustrates the Bartlett simplex concentrator, which should not be confounded with the old original three-deck iron table which has been in the market for many years. The Bartlett simplex has a three-decked table, each deck having a rifled, rubber top and was first placed on the market about a year

ago, since when a number of important improvements have been made.

**Lubricating Valves.** Western Lubricating Valve Co., Denver, Colo. Catalog 2. Pp. 22; illustrated.

Is devoted to a description and illustration of the company's Western lubricating valve, which is a combination with a hollow casing, adopted to contain oil, of an angle-cock proper within the casing, having a hollow turning plug or key, forming an internal pressure valve. The company claims for it a great saving in the leakage of the air and in the oil used.

**Portable Heaters for Oil Fuel.** The Rockwell Furnace Co., New York city. Pamphlet; illustrated.

Is devoted to the company's portable heaters for oil fuel. These are intended for heating work too bulky or inconvenient to remove to a furnace, and where it is desirable to take the heater to the work, as is the case with annealing, hardening, expanding, bending, brazing, skin drying, lead melting and rivet heating.

**Tools for the Engineer.** Mound Tool & Scraper Co., St. Louis, Mo. Folder; illustrated.

The modern engineer fully realizes the importance and time-saving feature of good tools around an engine room, and the inconvenience and loss of time and annoyance caused by a lack of them. This little folder contains an illustration and description of the various tools and scrapers manufactured by the Mound Co., which includes tools for scraping valves, Rabbitt metal, journals, bearings, etc., tools for packing and spitting and chisels, screw drivers, etc.

**Personal.**

John B. Parish, mining engineer, 517 Cooper building, Denver, Colo., is in New York city.

Arthur Lakes, geologist, of Denver, Colo., has opened branch offices at La Jolla, Cal.

Willard F. Snyder of Salt Lake, Utah, is in the east on a visit to New York and Boston.

Horace W. Winehell of Minneapolis, Minn., recently visited the Coeur d'Alene district, Idaho.

Charles W. Merrill, metallurgist, is now located at rooms 502 and 504, 143 Second street, San Francisco, Cal.

J. V. N. Dorr, of Pluma, S. D., recently completed an examination of mining properties in British Columbia.

George T. Eves has been appointed manager of the First Thought Extension Gold Mining Co., Orient, Wash.

Arthur W. Stevens, mining engineer and chemist, has moved his offices from Boise, Idaho, to Los Angeles, Cal.

Carl F. Dietz, mining engineer, of Melrose Highlands, Mass., is on an examination trip to mines in Mexico and Utah.

Marcus Daly of New York city, president of the Daly Reduction Co., is at the property of the company at Hedley, B. C.

R. B. Hugard, superintendent of the Old Dominion Copper Co., Globe, Ariz., is in Los Angeles, Cal., on company business.

James Tobin, a diamond drill contractor of Johannesburg, South Africa, and formerly of Ishpeming, Mich., is visiting in that city.

Robert Kirkby of Fife, Scotland, has been appointed superintendent of the mines of the Dominion Coal Co., Cape Breton, N. S.

George N. Hicks of Omaha, president of the Sylvanite Deep Mining Co., is inspecting the company's property near Magnolia, Colo.

Frank B. Cook has returned to Salt Lake, Utah, from a visit of inspection of properties in the new Yellowstone district in British Columbia.

W. A. Pomeroy has succeeded to the management of the Lustre Mining & Smelting Co., with properties in the state of Durango, Mexico.

Dwight Furness at the head of the Dwight Furness Co., has returned to Guanajuato, Mex., from a several months' visit in the United States.

Ross Thompson, formerly operating in the Boundary district, British Columbia, is now operating copper properties in the Yerington district, Nevada.

Fred J. Yates, manager of the Annuity Mining & Reduction Co., has returned to the company's property at Sunset, Colo., from a short visit in the east.

Arthur C. Terrill, for the past two years professor of mining and metallurgy at the University of Oregon, has been appointed professor of metallurgy at the

University of Idaho. Professor Terrill returned recently to Oregon from a trip to Tacoma, Seattle and the Coeur d'Alenes, Idaho.

T. N. McCauley of the Mascot Copper Co., operating at Dos Cabezas, Ariz., is in San Francisco, Cal. He will visit Salt Lake, Utah, before returning home.

R. H. Gregory, general manager of the San Carlos mines in the Merquital del Oro district of Zacatecas, Mexico, has returned to the property from his trip to London.

Ben B. Thayer, assistant to President W. H. Rogers of the Amalgamated Copper Co., is in Butte, Mont., making his semi-annual inspection of the company's holdings.

P. J. Donahue has been appointed consulting engineer for the Exploration Co., a New York and Colorado corporation organized to operate properties in Colorado and Utah.

W. W. Robinson, manager of the Providencia mine, Parral, Chihuahua, Mexico, is in Kansas City, Mo., on company business. He will visit San Francisco before returning to Mexico.

F. W. Cronk, formerly publicity manager for the Colorado Iron Works, Denver, Colo., and other western machinery houses, has accepted a similar position with the Cotton States Belting & Supply Co., 7 South Broad street, Atlanta, Ga.

William Templeton, minister of mines, and W. R. Brock, director of the geological survey of Canada, visited the mines of the Boundary district last week, and were the guests of A. B. W. Hodges, manager of the Granby interests in British Columbia.

James M. Campbell, superintendent of the Magistral mines in the state of Jalisco, Mexico, suffered a stroke of paralysis recently while riding horseback. His horse returning to camp without him, a searching party found him lying unconscious by the roadside. He is now at Hot Springs, Ark.

**Obituary.**

Captain Enoch Roberts, of Duluth, Minn., died last week in Ishpeming, Mich., at the age of 73 years. Captain Roberts came to the United States from Cornwall, England, in 1860, locating in the copper country, where he was in charge of operations at the Arcahan property. In 1869 he removed to Ishpeming and opened the East New York mine for the Collins Iron Co. Afterward he held important positions at the Green Bay, Republic, Metropolitan and Vulcan mines on the Marquette and Menominee ranges. Until last fall he was in charge of a mining property in the Iron River district.

The Transvaal produced in June 1902, 600 short tons of copper ore, 104,123 tons lead ore, 136,360 tons tin ore, 254,892 tons coal (sed.), 11,000 tons magnesite, 452,000 tons flint, and 2,602,000 tons limestone.

**Technical Schools and Societies.**

*Montana School of Mines.*—A small sampler and plant for making smelter tests has been installed at the school at Butte. Ore will be treated free of charge.

*Missouri School of Mines.*—The fall term of the 37th year of the school opens Sept. 22. Entrance examinations and re-examinations will be held Sept. 19-21.

*International Congress of Inventors.*—At the recent third annual meeting of the Congress the following officers were elected: President, Walter S. Strowger, Rochester; first vice-president, S. Feinstein, Rochester; second vice-president, Philip T. Dodge, New York; secretary-treasurer, Ralph T. Olcott, Rochester. Plans are under way for active work during the fall and winter toward obtaining favorable action by Congress on bills which will be presented for the establishment of a standard for a United States patent, for the preservation of models in the patent office, etc.

*Oklahoma Geological Survey.*—At the recent meeting of the Oklahoma Geological Commission, consisting of the governor of the state, the superintendent of public instruction and the president of the state university, Governor C. N. Haskell was elected president of the commission. E. D. Cameron was elected secretary, and the president of the state university, A. Grant Evans, was elected executive officer. Dr. Chas. N. Gould, professor of geology at the state university of Oklahoma, was elected director of the survey. Five parties are already in the field under the supervision of the director and L. L. Hutchinson, assistant director. One party is in the western part of the state examining salt and gypsum deposits. Two parties are in the oil fields, one near Denning and the other east of Tulsa. Another party is examining building stone beds in the southeast part of the state. The fifth is in the Arbuckle mountains.

*International Congress on Electrical Units.*—The international congress on electrical units and standards will assemble at Burlington House, London, in October. The general object of the gathering is to consider and advise as to the steps which should be taken to bring about an agreement in the definition of electrical units which form the basis of legislation in different countries, and in the method of constructing and employing the electrical standards necessary to give effect to these definitions. The conclusions arrived at by the representatives of the various national standardizing laboratories who met in 1906 will be brought forward as a basis for discussion. They are also generally in accordance with the decision of the Chicago Congress, held in 1893.

*Monazite in Brazil.*—The British consul at Bahia reports the exports of monazite sand for 1907 at 1,741 metric tons, as against 945 tons in 1906, 1,039 tons in 1905 and 2,901 tons in 1904. The bulk of these shipments has been made to Germany, where the thorium is recovered for use largely in the manufacture of the Welsbach incandescent lamp mantle.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ARIZONA.

### Pitsonix.

Crosscuts on the 300 and 500 levels of the Shylack mine, in the Black Hills district, Yavapai county, show the ledge 60 ft. wide, with neither wall in sight. The entire vein filling is mineralized, streaks varying in width from 1 ft. to 10 ft., assaying from 10 to 100 ozs. in silver, besides some gold and copper values. The Shylack is one of a group of 21 claims owned by the Arizona Central Copper Co., 2 miles south of the Yeager Canyon Copper Co., proven below the 1,000 level. The locations cover a series of veins in the Yavapai schist belt that traverses the county from the United Verde mines at Jerome to the summit of the Bradshaw mountains, and in which some of the best properties of the country are situated. The company will develop the Shylack ledge to a depth of 1,000 ft., though the main working shaft is now down between 300 and 600 ft.

The Monica mine in Kirkland district, this county, is running steadily day and night treating ores from the Monica mine. Regular clean-ups are made every two weeks. The 20-stamp mill will be increased to 60 stamps about the first of November. The development of the property is being pushed, good ore being in every heading. The mine promises to rival any of the large producing properties of the Weaver district, and already the ores carry as high a gold value as any of the large mines in the district.

The Union Basin Mining Co. in Mohave county is shipping another car of high-grade zinc ore to the smelter at Tola, Kas., for treatment. This is the second car load of ore of this character shipped from the Golconda mine. The first car ran 50% zinc, besides some gold and silver values. A number of miners are at work opening up the property under the directions of John Boyle, Jr., general manager for the company.

### Bisbee.

A rich discovery of lead-silver ore is reported from the Chiricahua mountains, on a property of a group of claims belonging to the Bisbee Sonora Development Co. The ore caps the copper sulphides, which lie in the porphyry dike cutting through the lime. Assays have shown good values. A force of men was put to work on the new strike at once and two miners took out half a car of ore in a day. More miners have been sent from Tombstone and shipments will soon be begun. The ledge is a perfect contact and is so soft that it can be taken out with picks.

At the Sacramento shaft of the Copper Queen Co. 400 tons of ore are being raised daily and shipped to the company's smelter at Douglas. The different shafts of the company are rapidly being equipped for electric transportation to the 1,200-ft. station of the Sacramento shaft and in a comparatively short time all the ores of the company will be raised

to the surface by way of the Sacramento shaft. The Copper Queen's August production was 8,000,000 lbs.

The Calumet & Arizona company produced about 4,000,000 lbs. of copper in August. This is about the same amount as that made during the previous month, notwithstanding the new work being done at the smelter which is under way.

The Junction shaft of the Superior & Pittsburg is handling more water than for some time, 3,783 gals. being raised every minute. No. 5 raise from the No. 22 crosscut on the 1,200 level has been carried through to the 1,200 level the past week and the 1,300 level is much cooler on that account. Before the raise was completed the temperature on that level was in the neighborhood of 140 degrees. On the 1,400 level the ore recently encountered in the faces of drifts Nos. 1 and 2 has been passed through and at present but few stringers are being encountered. The drifts on this level will have to be driven quite a distance farther before ore is reached on account of the slope in the bodies on the level above. A 2,500-gal. Prescott low-lift pump is being removed from the 1,000-ft. station of the Briggs shaft and installed on the 1,400 level of the Junction.

### Benson.

The Peacock Copper Co. has purchased a group of 17 copper claims in the Johnson district from Ben N. Williams. The property adjoins the Arizona Cons. group, the Johnson Copper Co.'s group and the Centurian group. Development work, under the superintendence of Mr. Williams, will be started at once.

The Calumet & Arizona Co. has made a final payment to E. A. Clark and John Scanlon of \$67,500 on the Copper Grant group in the Copper Creek district, 60 miles north and about 15 miles west of Benson. It is believed that a railroad will be built from the property to Benson.

The Mansfield smelter is now completed and ready to begin operations.

### Chifton.

The directors of the New England & Chifton Co. have recommended the construction of a concentrator at the Copper King mine and the building of a tram from the Antietam to the tunnel connecting it with the Copper King. Regular shipments continue from this mine, but development work only is being done in the Antietam. Edmund Bristol is managing director of the company.

## CALIFORNIA.

### San Francisco.

The Hazel Mining Co.'s property, known as the Gladstone, is located at French gulch, Shasta county. Ed. Young is superintendent and I. O. Jilison manager. The equipment consists of a 20-stamp mill, a 75-hp. electric hoist, one 150-hp. compressor, one 170-hp. compressor, two Wilfley tables, six Frue vanners,

a 6-ft. duplex plunger pump and a 25-hp. electric generating plant. The company contemplates enlarging the power plant to 910-hp. and the mill to 30 stamps. The greatest depth in development is 1,100 ft. The ledge is from 4 to 5 ft. in width. The ore is a white quartz, with values averaging about \$15 in gold to the ton. The company also owns a saw mill with a capacity of 10,000 ft. of lumber per day. One hundred and fifteen men are employed. This mine has produced \$1,290,784 and paid \$468,000 in dividends.

C. C. Fox has a lease on the Brown Bear mine of the French Gulch district, which must not be confused with the Brown Bear mine at Deadwood, about 10 miles away. The mine has a high record for values.

Al. Geiser, who owns a small group of claims in the French Gulch district, has put up a 2-stamp mill which has been running successfully since started.

### Los Angeles.

Fourteen miles south of China is the new camp of Gold Valley. S. D. Warfield and Mark Neumayer at a depth of 100 ft. have encountered a 16-in. streak of free-milling ore, which returned \$130 on two tons of ore ran through an arrastra. The vein is in a granite and diorite formation, cut by porphyry dikes. A 2-stamp Nisson mill has been ordered from Los Angeles. This new camp is situated on the east side of the Providence mountains 21 miles from Fennel on the Santa Fe railroad.

The Baxter Mining Co., with headquarters in Los Angeles, owns four claims in one group, two claims in another and a mill site in the Resting Springs district, Inyo county, eight miles from the Tonopah & Tide Water railroad. The four-claim group is a silver proposition. From surface prospecting to a depth of 20 ft. several thousand dollars worth of shipment ore has been taken out and is on the dumps. The ore assays 65% lead and 18 ozs. silver. The ore of the group of two claims, while in the same general formation, shows values of 66.7% lead, \$7.32 in silver and \$16.95 in gold. Active development was begun on Sept. 1. Officers of the company are: W. H. Jay, president; M. A. Propper, secretary; J. C. Meadows, treasurer.

### Keeler.

San Diego and Los Angeles mining men who are developing a valuable gold mine in this county have filed articles of incorporation as the Golden Rod Mining Co. with a capitalization of \$250,000. The company owns three claims eight miles from Ballarat and 60 miles from Johannesburg. A trial run of 17 days of the 5-stamp mill netted \$500 in gold. It is the intention to acquire capital for 15 additional stamps.

Inyo county is credited with a larger variety of minerals than any other California county. The mines have produced millions of dollars, the single camp of Cerro Gordo being credited with \$13,000.

400. There are in Inyo county large bodies of borax, salt, nitre, marble, slate, building stone and phosphates, and unlimited quantities of soda in the water of Owens lake. In the near future electricity will be an important feature in the development of mineral and other resources of the county.

The Cerro Gordo district, which takes its name from the old Cerro Gordo mine, now owned by the Four Metals Mining Co., is situated in the Inyo range or extreme southern portion of the White mountains. This district is reached by a narrow-gauge railroad over the White mountains and by stages to Johannesburg and Mojave. The Southern Pacific is building rapidly a broad-gauge railroad from Mojave to Keeler, a distance of 150 miles. Rails are laid and trains running out nearly 50 miles.

The old Flagstaff property of five claims, five miles northeast from Keeler, is being worked by Will M. and W. H. Johnson. The ledge is from 3 to 4 ft. wide. Development is by a 175-ft. shaft, a 35-ft. shaft and a 600-ft. tunnel. Values are about \$45 in silver and lead, with occasional values in copper.

The great Cerro Gordo mines were first located in the sixties by Mexicans, and the ruins of a primitive smelter still exists. The holdings were disposed of to Americans, who equipped the mine, built a modern smelter, started mining and in less than seven years shipped by mule train to Los Angeles over \$13,000,000 in silver, lead and gold bullion. During this period 100 8-mule teams were used in the transportation. Machinery, lumber and other supplies were transported in at \$120 per ton, but nevertheless the Cerro Gordo prospered. The Four Metals Mining Co. is now in full possession and ownership. The main shaft is near the apex of Cerro Gordo peak at an altitude of nearly 8,500 ft. above sea level and eight miles from Keeler. The mine has a well developed water supply six miles to the north, the water being piped to the mine. Located as it is the mine site is ideal for the operation of the aerial tramway to the smelter, located at a slight elevation above the top of Keeler. An aerial tramway just completed from the mine to the smelter is 37,000 ft. long, of the "Kilind Non-Rotating" wire rope, placed in position by the Macomber & White Rope Co., of Chicago. The buckets were furnished by the Colorado Iron Works of Denver, Col. Development of the property is to the depth of 900 ft., with levels at 90, 192, 400, 700 and 900 ft., with much drifting on each level. The ledges are pronounced as two fissure contact veins. The values are lead, silver and zinc, the latter evidently predominating. Less than a year ago a car load of the zinc ore shipped to Kansas City netted an average return of over \$10 to the ton. The smelter just above Keeler is fully equipped and has a capacity of 200 tons per day. A new smoke stack, slag pot and 150-ton furnace are being placed. An electric power plant is being erected at Lone Pine, 17 miles from Keeler. Thousands of tons of ore-bearing rock is ready to be hoisted from the old stopes and tunnels, and

thousands of tons of high-grade ore still remains in place in lower workings. Future work will be conducted from the 900 level. E. O. McGrath is general manager. The office of the company is at San Jose, Cal. H. T. Welch is president, F. H. Ross vice-president and A. R. Shout secretary.

In the Angus range, four miles from Keeler, Townsend and Butler are developing a group of five claims. The veins are 4 ft. wide in granite and porphyry. Average values are \$20 in gold to the ton.

Twelve miles south of Keeler in the Darwin district Spencer and Harper have made discoveries of ledges with ore carrying values of from \$30 to \$50 to the ton in gold in a 60-ft. tunnel.

Myers and Aiken, of Keeler, are operating a section of much promise a few miles away in which the values are 60 ozs. silver and 75% lead.

M. and A. Bierce a few miles south of Keeler located a group of four claims in which the ore carries values of 69% lead and 28 ozs. of silver.

#### Alturas.

Manager Gaisly of the Gold King mine in the Hoag district has received returns of a trifling over \$1,000 from the mint from the bullion shipped as the result of six tons of quartz crushed. The property is being worked under bond and lease from Dunnivan, Broadhus and Shartel.

## COLORADO.

#### Denver.

The Yak Tunnel Co., having leased for a term of years the A. Y. & Milling property in California gulch, will operate it to greater depths through a crosscut from the tunnel. This property was the original basis of the Guggenheim fortunes and also the incentive to the subsequent engagement of the Guggenheims in mining and smelting.

The new lessees on the Matchless property are preparing for some extensive work. Regular shipments of siliceous ores are being made from the No. 5 shaft. A new engine and hoist are being placed at No. 7 shaft. It is proposed to explore the large body of siliceous ore in which the discoveries of high-grade ore were made when H. A. W. Tabor owned the mine.

Work in the 400 level of the Bohn shaft a few weeks ago disclosed a body of hard carbonates accompanied by a layer of extremely rich chlorides. A shipment of the sacked material will soon be made to the smelters.

The track connecting the Valley shaft of the Lucena Mining Co. in Big Evans has been completed and 40 tons of good ore is now being sent over it daily from the mine. It runs well in gold and is high in lead.

W. S. Jones, leasing on the Robert E. Lee property is shipping over 100 tons per month to the Salida smelter.

Much development work is being done in the Holy Cross district. Several large properties are starting up, all on shipping veins.

W. J. Keating & Co. which has secured control of the White Quail group is driv-

ing tunnels at three different places and has opened a vein in each place.

Manager J. W. Bailey of the Grand Trunk is considering the erection of a mill for handling his own and custom ores.

A number of mines in the district have been shipping regularly for three or four months.

The output of ore from Leadville mines for August was approximately 70,000 tons.

An important strike has been made in the MacLean property in Buckskin gulch. Ore appears in several distinct veins. A tunnel has been driven 100 ft. and nearly the entire distance shows high-grade ore. Owing to the distance of this property from the Leadville smelters, the owner, A. D. MacLean, of Leadville, is considering the advisability of building a concentrating mill near the tunnel site.

More work is being done in Buckskin than at any time since the early days of the district.

#### Cripple Creek.

The August output of this district amounted to 68,800 tons, having a gross value \$1,330,774. There was an increase in tonnage over July, but a decrease in bullion value of \$14,257. At the present time the mines are shipping larger quantities of ore than at any previous period, amounting to about 70 broad gauge car loads daily.

The entire plant of the Dante shaft No. 2, on the south slope of Bull hill was destroyed by fire on the night of Aug. 31. The Dante is operated by the British-American Leasing Co. A new plant will be installed at once. The company has for a long time been paying dividends monthly.

A strike is reported from the Carbonate Queen on the western slope of Battle mountain, under lease to the Big Four Leasing Co. Assays run from 3 to 8 ozs. in gold to the ton.

The Colorado State Investment Co., operating the Abe Lincoln in Poverty Gulch, has entered a rich shoot in the slope between the 700 and 600 levels. The vein, an altered granite, is from 4 to 6 ft. wide and is seams with sylvanite.

The Vindicator Cons. Co. is shipping the highest grade of ore of any mine in the district having similar capacity. The main shaft is 1,100 ft. deep.

The output of the Gold Sovereign for August was over 1,800 tons. The ore averages \$15 with little sorting. One of the shoots is from 10 to 12 ft. wide.

The Stroug Gold Mining Co. is about to build a new ore house of large capacity.

The Morris brothers, working the Morning Star of the Ancia on Bull hill, are installing an electric hoist to replace a windlass. A chimney of ore was recently opened up on the 300 level from which a number of shipments were made, returning as high as \$20 to the ton.

At a depth of 200 ft. Howland & Son, leasing on the Rocky Mountain claim of the Beacon Cons. Co. have opened up a shoot that carries a great deal of high-grade ore. In a wire vein carrying rich sylvanite has been disclosed.

Briggs & Waters, working the Little

Fauntleroy on Gold hill has made an important discovery at a depth of 120 ft. below the Ophelia tunnel level of a vertical vein which carries high values. It is more than 3 ft. wide between walls and will ship about 2 ozs. gold to the ton without sorting.

A gain of 12 ft. a day has been made in the Carlton contract at the deep drainage tunnel, due largely to the use of a higher-grade explosives.

#### Silverton.

The long controversy over the Gold King having been adjusted, the work of reconstruction is proceeding. Superintendent S. M. Haynes states that as soon as new quarters for the miners can be constructed, a larger force will be employed than ever before. Much new machinery will be required.

Work has been resumed at the Esmeralda between Silverton and Eureka, and from it D. E. Carmichael & Co., the leasers, are shipping a car every five days of \$100 ore. A milling and cyaniding plant will be necessary to treat the average \$30 tellurides.

Lonis Johnson, Henry Tucker and Nicholas Roff have a new 25-ton mill at the Little Nation mine, which is running to its utmost capacity.

The Eureka Cons. Mining Co. at Eureka has been using a diamond drill with great success. The small bore was scarcely started when a vein 12 ft. wide was encountered. The ore is excellent milling stuff. Very little use of the diamond drill has been made in the San Juan country, but the success of this experiment will probably lead to more extensive prospecting in that manner.

For some time past the Hamiet mill has been running on trial lots of ore from the Tom Moore mine.

The Danville Leasing Co., working the Shenandoah mine through the Tribby tunnel, has considerable high-grade ore exposed.

The cave in at the Tiger was found not to be as serious as first reported and work has been resumed. The damage to the mill will be repaired as soon as possible, when both the Iowa and Tiger mines will be worked.

At the Ontario mine 700 tons of ore is ready for shipment as soon as the wagon roads are in passable condition.

#### Gurray.

While prospecting with a pick along the walls of a tunnel on the Thirkedown a few days ago a large body of rich gold-bearing ore was uncovered.

A force of 20 men is at work on the Torpedo-Eclipse property and the showing is exceptionally good. The roads to the mill site are being repaired preparatory to hauling up lumber and other materials for the new concentrator.

#### Gumison.

The Blaine mill is finished and running. A car of shipping ore has been sent to the Salda smelter. A survey is being made for a tram line, designed to deliver the ore from the mine to the mill a mile and a half below at the town of Gothic. Judge Dissette, the manager, is considering the advisability of placing a diamond

drill near the portal of the present tunnel to prospect for the main vein.

Manager Arzeno of the Augusta mine has returned from Denver and it is expected that mill improvements will be started at once. A large amount of ore is now being sent down the tram to be piled up pending the completion of the plant.

#### Georgetown.

The Mineral Chief on Democrat mountain is producing more heavily than at any time in the last five years. Since the company's 50-ton mill was started up a short time ago, the machinery has been running night and day. The new aerial tramway, 75 tons daily capacity, has cheapened the cost of delivery to about 75 cents per ton. The former cost of hauling was from \$1 to \$1.50 per ton.

Work is about to be resumed in the Capital tunnel. It is now in a little over 1,700 ft., and 15 veins have been cut. The showings in the drifts and stops indicate ore enough to insure steady supply for the 125-ton concentrator some years.

#### Central City.

J. A. Curran and associates of Denver are sinking on the Ridge local at the Saratoga. The light machinery now used will soon be replaced by a much heavier equipment.

Sherman Harris & Co., leasing the Rockford property in Russell gulch, are sinking a permanent working shaft. Rock is hoisted by a whim, but steam or electric power will be substituted.

Machinery was recently placed on the Cataract shaft of the Lotus group in Russell gulch.

In Pine Creek district Dr. Temple of Kansas City will purchase and install a plant of machinery for extensive work on the Snuggler group.

Additional machinery is to be placed in the Evergreen mill by the Denver Engineering works.

## IDAHO.

#### Wallace.

John Hackett is reported to have recently made a rich strike on property back of the New Jersey on the Wardner road.

Fred Donaldson has bonded the Enterprise group on the hill above the New Jersey mill for \$50,000 to Spokane, Wash., men. A strike was made on this property a few weeks ago, of from 4 to 5 ft. of good milling ore.

Work has been resumed at the Surprise mine on Pine creek with a full force of men. The new 125-ton mill is said to be doing satisfactory work. It is the intention to begin the shipment of concentrates at once and to continue steadily.

Some very rich ore has recently been struck in the Pilot mine at Murray. The principal values are in gold and silver.

Work is being continued at the Copper King mine. The boarding and bunk house, the compressor building and the barn have been completed. All grading for the flume has been done and the materials for its construction are on the ground. The compressor and other machinery is due and will be installed and

made ready for operation as soon as possible. It is believed that ample funds will be raised to drive the proposed tunnel.

A strike was recently made on the property of the Mineral Point Mining Co. south of Oshoro of 1 ft. of solid gray-copper ore. The strike was made in a winze being sunk from the upper tunnel at a depth of 250 ft. The principal owners of the property are: S. V. Osborn, Wm. Allen, Thos. Holoban and Chas. Anderson.

The Federal Mining & Smelting Co. is now producing from its four mines from 10,000 to 12,000 tons of ore per month.

The Panhandle smelter, the control of which has been recently acquired by the Greenoughs, will be started in September according to present plans. The company is putting in additional furnaces, roasters, etc., laying new concrete floors and erecting new buildings.

The Anchor Co. at Burke is preparing to sink a vertical shaft. The property has been closed for some time owing to a change being made from steam to electric power. The company recently opened a vein of Galena and carbonates in a shallow shaft from the tunnel level, and it is the intention to continue this shaft, and crosscut to the vein when sufficient depth has been gained.

#### Mullan.

The Springfield Mining Co. has opened the vein in the lower crosscut tunnel, which has been under construction for two years. The vein is reported to be 22 ft. wide, with 2 ft. of good copper ore on the hanging wall side. The tunnel is 1,900 ft. long and taps the vein at a depth of 700 ft. The property is located at the head of Champion creek on the St. Joe slope of the range three miles due south of Mullan.

The American-Commander Mining Co. has encountered what is believed to be a portion of the vein which made such a good showing of ore when opened in the Hunter tunnel. Where opened by the Commander, several hundred feet west of the showing on Hunter ground, the vein is principally iron, with some lead and silver values. The company will probably drift east on the vein towards the Hunter.

The National Mining Co. has practically stopped operations, the shaft having been flooded. The company has ordered a larger pump from the Chicago Pneumatic Tool Co. of Chicago, through the Hallide Machinery Co. of Spokane, Wash., and as soon as this is installed work will be resumed sinking on the vein.

## LAKE SUPERIOR.

#### COPPER.

#### Houghton, Mich.

The most important development of the past week took place in the section 16 shaft of the Atlantic Mining Co. where, in drifting on the 12th level, to within 50 ft. of the Baltic-Atlantic boundary line the much-sought Baltic lode was encountered, showing a very fair degree of

mineralization. The Atlantic's operations during the past six months have been largely confined to this level, where copper ground was first disclosed early in May, 225 ft. south of the shaft. The drift continued in vein rock carrying copper in commercial quantities for a further distance of nearly 150 ft., when it again entered a mixture of broken vein matter and trap rock. A crosscut of about 25 ft. into the hanging wall from the end of the drift, which has now attained a length of 550 ft. south of the shaft, resulted in the present very encouraging showing. Drifting south from the shaft at the 13th level is also in progress and, although the opening at this point is limited, an excellent showing of copper rock has already been disclosed. The shaft is again being sunk 75 ft. below the 17th level, through badly shattered ground requiring close timbering and making rapid sinking impossible. A crosscut east at the 12th level in search of the conglomerate underlying the Baltic amygdaloid lode is in over 440 ft. without attaining the desired result. The recent finds have greatly altered the Atlantic's prospects for the future, which, unquestionably, lies in this section 16 property, and it is confidently expected that the company will meet with better results in the future. The stamp mill is still treating Michigan mine rock, and two stamp heads, recently overhauled, will shortly be falling on Superior mine rock. A rock crusher has recently been installed at the Atlantic mine and is breaking rock as it comes from the mine, but no intention has been expressed to resume milling operations on Atlantic rock in the near future.

At the Globe shaft of the Copper Range Cos. Co., drifting is in progress at the 1,000 level, but the showing to date has revealed nothing of importance. The drifts are in about 150 ft., showing the lode well defined and carrying some copper and, although the showing is not discouraging, a decided improvement will be necessary to cause the company to exercise its option on the property. As 1,000 ft. is a shallow depth at best in this district the management is not likely to condemn the property on showings had to date.

The Superior Copper Co. is making improvements to its surface equipment at the No. 1 shaft. A new change house was completed this week and the frame work of the large rock house is rapidly going into place. The railroad connecting the mine with the Atlantic stamp mill is nearing completion and the company should be in position to begin rock shipment by Sept. 15, taking rock from the large stock pile estimated to contain 18,000 tons of good copper rock. The construction of the shaft-rock house has progressed far enough to allow a normal resumption of operations in the No. 1 shaft, all hoisting now being done during one shift only.

The Keweenaw Copper Co. is sending a few cars of rock to surface daily from the Maudan mine, operations being continued wholly to drifting, no stopping or sinking being in progress. The company is centering its attention on the mill test now under way. About 250 tons of rock

are treated daily, but no information is given out regarding mineral returns, and without official confirmation no definite statement relative to copper contents of rock can be had, but the consensus of opinion held by many local mining men who have given the subject considerable attention, is not favorable, they believing that the rock will not return more than 10 lbs. of copper to the ton.

## IRON.

### Marquette, Mich.

A number of large lumbering companies with important interests on the Menominee range have pooled their holdings and are having a geological survey made of the various tracts to determine whether or not there are deposits of iron ore on them. The work is in charge of Professor C. K. Leith of the University of Wisconsin. Some of the most valuable mines in the Lake Superior region, particularly on the Mesabi range, have been opened on lands originally purchased for their timber, and it is not at all improbable that properties involved in the present geological survey will be found to possess mineral worth. Among other lumbermen who have profited greatly as a result of the unexpected discovery of iron ore in Mesabi lands were a considerable number from Michigan. These included Eddy Bros., George L. Burrows, Ezra Rust, W. R. Burt and G. B. Goff of Saginaw, and Robinson & Flynn and W. H. Yawkey of Detroit. Much of the acreage controlled by the Pillsbury interests of Minneapolis was acquired for the pine timber which covered the tracts.

For the purpose of opening a southerly extension of the Leonard deposit, the Steel Corporation is sinking a new shaft in the Chisholm district. Underground mining is necessary because the ore body is capped by a stratum of taconite too great in thickness to permit of stripping. The shaft will be completed and put into commission next spring. The pit at the Leonard is being materially enlarged. Before being transferred from the Great Northern interests to the Steel Corporation the open cut at this property had become exceptionally deep. Both steam-shovel and underground mining has been in progress, ore being taken out over a skipline extending up one side of the pit.

Adjoining the Leonard is the Steel Corporation group, composed of the Monroe-Tener, Glen, Clark and Chisholm, all of which are to be stripped and practically converted into a single open cut of vast proportions. Much of the over burden at the Monroe-Tener is already removed, the property having been opened as a milling proposition. The Glen, Clark and Chisholm are underground mines and have been wrought from seven or eight shafts. The new pit to be excavated will open into that of the Leonard, as a result of which mining work at the latter property will be much facilitated. The stripping will also extend to the Pillsbury mine, which already is an open-cut property of large proportions. Thus in the course of the next few years there will be completed one of the very largest pits to be found anywhere.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores from the various camps for the week ending Sept. 5 and for the year to that date were as follows in pounds:

### LEAD ORE SHIPMENTS.

	Week Sept. 5.	Jan. 1- Sept. 5.
Alba-Neck City .....	188,390	788,390
Aurora .....	17,226	54,190
Badger-Powack .....	932,492	3,932,492
Carl Junction .....	132,450	1,324,450
Carthage .....	6,170	61,700
Cave Springs .....	11,220	112,200
Duane .....	86,710	3,122,340
Galt .....	101,450	1,014,500
Granby .....	1,175,226	1,175,226
Joplin .....	228,402	9,354,592
Miami .....	62,710	1,028,310
Oronogo .....	457,230	4,572,300
Poncha .....	1,930	19,300
Prosperity .....	66,560	2,038,120
Quapaw-Baxter .....	488,790	4,887,900
Seneca .....	15,240	152,400
Springfield .....	37,020	370,200
Spurgeon-Spring City .....	111,380	1,113,800
Webb City-Cartersville .....	613,310	24,222,240
Zincite-Shrewel .....	12,390	123,900
Total .....	3,101,002	35,735,371
Value .....	\$37,828	\$1,941,655

### ZINC ORE SHIPMENTS.

	Week Sept. 5.	Jan. 1- Sept. 5.
Alba-Neck City .....	238,220	16,229,340
Aurora .....	271,226	11,146,246
Badger-Powack .....	76,660	10,267,740
Carl Junction .....	79,180	1,549,640
Carthage .....	130,420	3,852,970
Cave Springs .....	800,780	8,007,800
Duane .....	186,470	19,272,310
Galt .....	454,670	24,575,670
Granby .....	16,612,300	16,612,300
Joplin .....	2,207,420	76,601,397
Miami .....	253,310	6,436,648
Oronogo .....	246,500	12,940,790
Poncha .....	414,660	4,146,660
Prosperity .....	414,660	10,797,660
Quapaw-Baxter .....	361,140	1,526,680
Reeds .....	171,810	1,718,100
Sawville .....	143,090	3,019,090
Seneca .....	294,730	199,600
Spurgeon-Spring City .....	294,730	3,161,910
Stout City .....	3,474,961	103,356,476
Webb City-Cartersville .....	831,570	8,315,700
Westworth .....	88,255	10,797,660
Zincite-Shrewel .....	35,820	358,200
Arkansas .....	35,820	358,200
Total .....	9,789,075	339,183,090
Value .....	\$139,192	\$2,741,969

### Joplin, Mo.

Unusual mining activity is noted in Leadville Hollow where a number of rich strikes have been made. Among these is a lead strike by the Try More Mining Co. A stratum of lead ore from 6 ins. to 1 ft. in thickness is found across a 14-ft. drift.

A rich lead deposit has been penetrated on the Leonard land by George Douthitt and associates. A shaft near the dividing line entered the ore at 40 ft.

The Pittsburg Missouri Co. is reopening an old shaft in Leadville Hollow to work a rich deposit of lead and zinc silicate found at 80 ft. The ore has a 10-ft. face and the dirt runs about 5 to 10% silicate and 4 lead with a small percentage of zinc blende.

The Spring City camp also continues to be active. The Argosy plant has been completely overhauled and its capacity increased. A new run of ore has recently been developed which demanded a larger equipment.

McNulty and Long, holding a lease on the Alpha mine, resumed operations this week after a shut-down since spring. The Alpha is one of the old-time producers. A 150-ton mill is located on the ground.

A rich strike of zinc ore has been

made at the west end of Third street in the old Georgia mine in a shaft sunk to a depth of 39 ft. The ore is pure rosine zinc blende in boulders. Drifting has only been begun but a tunnel will be made this week. The ore is being milled on a custom plant but hand jigs will be installed for next week.

#### Webb City, Mo.

The White Dog mine north of Webb City on the Majestic lease will reopen next week after a prolonged shut-down. The pumps have already been started. The 147-ft. level which was formerly worked will be worked again as there is still a large amount of uncut ground. The 163 level which is untouched as yet, but which is exceptionally rich in sheet ore will be opened. The hoists will be installed to hoist the ore from both levels. During the shut-down the milling plant was thoroughly overhauled and many improvements made.

A new concentrating plant will be erected on the Sunset lease at Duenweg. The shaft is down 132 ft. where a drift has been run.

#### Carthage, Mo.

A good strike of ore has been made in two drill holes on the C. E. Luke land northwest of Carthage. One hole on the 40-acre lease entered ore at 220 ft. The hole being sunk to 270 ft. The second hole is just completed and the record tallies with the first. The holes are 250 ft. apart and every indication points to a good ore body underlying the lease. Further drilling will be done.

Baloney and Jemison struck rich ore at 45 ft. in their new shaft on the Porter ground in Carthage.

#### Aurora, Mo.

The advance in the price of ore and the lower freight rate granted to Aurora by the Missouri Pacific railroad has done much to stimulate the mining industry in that camp.

One of the richest strikes for some time was made by Grant Seburn on the line between the Sphalerite and the Cleveland-Aurora lands. The ore was found at 35 ft. and a high grade of ore was found for 32 ft.

George W. Wheat has leased his land four miles south of Aurora to Springfield men who will develop it.

#### Baxter Springs, Kas.

Preparations are being made by a number of companies to start up their properties in this camp in the near future. Three mills will soon be ready for operation, the Chicago-Quapaw, the Good Luck and Lucile.

A large deposit of high-grade "skull-bone" silicate has been found in the Lancaster mine.

The Three F mine is turning out about 10 tons of concentrates per day. Enough ore has been developed to keep the mine running many months.

Deep mining has been started in the Galena camp by A. O. Holsing who has taken a lease of 20 acres on the Ping and Robertson lands. A 3-compartment shaft is being sunk, two compartments of which will be used for hoisting and the third for the pumps and column pipes.

## MONTANA.

#### Butte.

The Butte & Superior Copper Co. has become involved in litigation with John McAlpine, one of the company's stockholders, which may result in serious controversy. McAlpine is being sued by the company for \$8,000 due on stock subscription and he refuses to pay on the ground of fraud and misrepresentation.

Operations have been resumed on the Ticon mine by James A. Murray. The shaft has a depth of 500 ft., but the work is being done on the 300 level where a winze has been sunk to the 500 level. The Ticon is located between the Bell of the Anaconda Co. and the Speculator of the North Butte Co., both good copper producers.

All of the mines of the Boston & Montana Co. have resumed operations after a shut down of three months while repairs were being made to the company's smelter at Great Falls. The concentrator at the Great Falls smelter was started up Sept. 1 and the blast furnaces will be started during the coming week. The Mountain View mine was started up a week ago and the Pennsylvania last Monday. About 900 men were added to the company's payroll. No more ore is being shipped to the Washoe by the company. On the first day of shipments to the Great Falls smelter the Great Northern railway hauled 2,089 tons, and the next day 2,800 tons. The shipments will be gradually increased until the normal is again reached. The Boston & Montana Co. ordinarily mines an average of about 3,600 tons. In consequence of the resumption at Great Falls the Washoe is greatly relieved and many delayed repairs can be made.

The Anaconda Co. has completed the work of enlarging the shaft of the Belmont mine and it is now on the standard 3-compartment size. It is yet to be retimbered, and when that work is completed new boilers and machinery will be installed. The machinery of the Corra mine, owned by the Butte Coalition Co. may be used. The Belmont shaft is connected with the workings of the Anaconda mine at the 1,000 level.

The Tuolumne Copper Co. has given a contract to the Erie City Iron Works for six additional 150-hp. boilers, which will give the company a total capacity of 900 hp. for its hoisting plant, air compressor and pumping machinery. The boilers will be of special construction, to stand 150 lbs. working pressure and with a gravity system for disposing of ashes through a tunnel under the boilers. The Tuolumne Co. reports continuing improvement in the ore body being developed on the 1,000 level. A vein 26 ft. wide has been cut and drifting is being done on it. It is said to contain 4 ft. of rich ore, and it is the intention of the company to open it on the 800 and 600 levels. The ore body is not, however, continuous, for the vein was cut farther eastward and found to contain little of value there.

A large quantity of lumber and machinery for the British-Butte Mining Co. has been delivered on the company's placer ground west of Butte and work on

erecting the \$80,000 dredging plant has begun. The pit in which the dredge will be first operated is 150 ft. square and 12 ft. deep. Only 7 ft. of water will be required to float the dredge, and three large dams have already been completed. A 3-year contract has been entered into with the Butte Electric & Power Co. for electric power. The dredge will have a capacity of 2,500 cu. yds. per day, and 200 hp. will be required for its operation. The company claims about 1,000 acres of ground, but the government is contesting the company's right to all of it on the ground that it is not valuable for placer mining, though the company's manager claims it will yield an average of 50 cents per cubic yard.

The strike of coal miners in Wyoming may have a serious effect on mining and smelting operations in Butte and Anaconda. Ninety per cent of the coal used in Butte comes from the mines of Wyoming which are now shut down. A supply sufficient to run the companies about six weeks longer is on hand, and this is being augmented by shipments from Montana mines, but the latter can not furnish all the coal needed.

#### Basin.

At a recent meeting of the Mountain Mineral Land Development Co. held at the Eva May mine, plans were made for considerable development and improvement work. Water power will be installed at the concentrator by fluming water from the gulch 2,500 ft. away, giving a head of 150 ft. It is also planned to install an electric plant to be run by water power and to use electric machinery in mining operations. There is some talk also of building a smelter. The following men make up the board of directors: A. Vilsack, John Kearns and Anton Lute of Pittsburgh, Pa., John Dorn, August Kuebler of Sandusky, Ohio, J. G. Mizner and Alfred Graber of Finley, Ohio.

Work has been discontinued on the shaft at the Comet mine of the Montana Cons. Copper Co. A depth of 1,000 ft. has been reached and operations will now be confined to exploring and developing the different levels. Ore from the mine is being tested in the mill and is said to be showing up well. The mine will be placed in good condition. Between 50 and 60 men are now at work in the mine and the force will be increased as the mine is developed. The ore is mostly sulphides with values in copper, lead, silver and gold.

#### MISCELLANEOUS CAMPS.

**Libby.**—The tunnel being driven on the Montana Silver-Lead mines to cut the ledge showing 150 ft. on the surface, is in 600 ft. It is expected to cut the ledge at a depth of 150 ft. As depth is gained there is considerable showing of lead. Manager W. H. Lougee is building a wagon road. He will soon install a 7-ft. drill air compressor and start a cross-cut tunnel at a depth of 1,000 ft.

**Grace.**—A discovery of rich gold ore was made in July by W. T. Clark near this station. The ore also carries some silver values. Much of the ore showed free gold. The prospect is on a ridge between Fish creek and the Milwaukee

railroad. The main lead is 6 in. wide at the surface and widens with depth.

**Helena.**—Operations will be resumed on Sept. 15 at the concentrating mill at the Eclipse-Argo mine in Hell Gate gulch. The mill has been shut down for several months. A new 80-hp. boiler is being installed and some other improvements made preparatory to starting up. The mine is developed by two tunnels, one 700 ft. long and a lower one 1,200 ft. long. A 100 ft. winze has been sunk in the lower tunnel and it is the intention of the management to begin driving a level from the bottom of this winze early in October. The property continues to improve with development. The vein is large and gives every indication of permanency, and this summer a big supply of ore has been blocked out and will be treated in the mill as soon as it starts up. Frank L. Sizer is in charge.

## NEVADA.

### Goldfield.

The Liverpool Goldfield Leasing Co., of Los Angeles, has been developing the eastern portion of the Golconda claim of the Goldfield Cons. Co., and its vertical shaft has reached a depth of 500 ft. and crosscutting for the vein known to exist is now going on. The crosscut has reached a length of 120 ft. and there are indications that the vein is near. The largest owners in the company are: Col. E. Randolph, president of the Southern Pacific in Mexico; R. L. Rogers, vice-president of the National Bank of California; W. E. Joyce of the Globe Mills, Gilbert S. Wright and Charles G. Andrews of the Wright & Callender Co.; Dr. Granville McGowan, A. C. Denman of the street railway system of Redlands and I. B. Newton of the Harper-Reynolds Company.

A. D. Myers has secured a promising group of lead and silver claims in the Lee district about five miles west of Lee camp. The property consists of 15 claims, comprising the Belmont and Mountain Maid groups. Shallow openings show a strong vein for a distance of 3,000 ft. Assays give from 10 to 65% lead and up to 11 ozs. in silver.

### Rawhide.

At present there is a great shortage of ore sacks in camp and freight teams are hardly able to take care of the tonnage between the railroad and camp. The shipments for the last week in August were, as far as could be ascertained, as follows: Grutt Hill Mint Co., to smelter, 41 tons, value \$9,225; Rawhide Mining & Reduction Co., 16 tons, value \$2,040; Wonder King, to smelter, 15 tons, value \$5,740; Wonder King, to mill, 15 tons, value \$1,175; Truett Lease, to smelter, 32 tons, value \$2,272; Truett Lease, to mill, 63 tons, value \$3,150; Kearns, No. 2, to smelter, 25 tons, value \$5,000. Total tons, 207; total value, \$28,602. This does not represent all the shipments, for considerable ore was sent to the mills, of which there has been no accounting. There are more than a dozen regular shippers that send their products to the smelter or the mill each week.

In the north drift of the 100 level of

the Grutt Hill Coalition, the streak of high-grade ore varies from 6 ins. to 1 ft., while outside the streak there is 3 ft. of ore which will average \$200 to the ton. The shaft is down only 107 ft. and it is estimated over \$500,000 worth of ore is blocked out to be easily mined.

The Rawhide Avenue Mining Co. has completed arrangements for the installation of a hoisting plant and a mill to handle the large tonnage of high-grade milling rock on the dump and being developed. The main shaft is down to the 100-ft. point and for 32 ft. in the shaft a grade of ore running between \$15 and \$20 to the ton has been cut that insures a big output for the 30-ton mill that will be erected.

On the Grutt Hill Mint property, which adjoins the Coalition, a shaft is down to 183 ft. and has the rich ribbon gold-bearing rock that started in at the 110 ft. point. This property is in the regular weekly shipping list.

On Grutt Hill, on the estate of the Coalition Mining Co., six new hoists are now at work. These are the Grutt Hill Coalition, Grutt Hill Mint, Grutt Hill Mining, Dayton Toledo, Proseky and Gold Crater, and every lease has high-grade ore. The Coalition has five more hoists on various other parts of its 160 acres, and from each shaft high-grade and milling ore is being taken.

The most important work going on in the Big Four lease of the Rawhide Mining & Leasing Co. is on the crosscut at the 200 level. At the 100 level two veins were crosscut, one of which is of high grade. There is 4 ft. of ore assaying about \$233. The other vein has been cut into for 12 ft. where the values are \$25 to the ton.

On the Murray lease adjoining the Big-Four another promising vein has been encountered at the 200 crosscut to the east.

On Sept. 4 a disastrous fire destroyed the business section of Rawhide and many homes. The property loss is reported as about \$750,000. Relief subscriptions are coming in from other mining camps of the state and elsewhere.

### Searchlight.

Clayton and Crittenden, holding a lease above the 200 level of the New Year's Gift claim of the Duplex group have encountered a 14-in. streak on the 150 level that assays \$76 to the ton in gold. The great importance of this find is that it shows rich ore 50 ft. west of the faulting.

Fourteen miles south of here at camp Thurman the Lloyd Searchlight Co. is grading preparatory to the erection of a 10-stamp mill. The shaft is down to 200 ft. and several laterals or drifts have been run exposing excellent ore which in places is of very high grade.

In this locality is the Longfellow No. 2 owned by W. W. Williams, who reports finding \$100 ore at a depth of 25 ft. In the ore is a very large percentage of silver values.

### Chafey.

M. A. Bixby and associates who are now operating the old 30-ton Hendra mill on ore from the Chafey property

and leases on Monroe hill have decided to build a new 100-ton mill. Mr. Bixby has gone to Salt Lake to purchase the necessary machinery which will include modern high-speed rolls, five Huntington mills and six Wilfley tables. A 150-hp. steam engine will furnish the power. The new mill will be built at once at an estimated cost of \$25,000. It is also the intention to build a sampler to be used in conjunction with the mill, it being the plan of the management to handle custom ores in addition to those from its own property.

### Golconda.

The shaft on the Oswald and Thompson lease on the Kramer hill property is now down 125 ft. on the vein. The rock from the bottom of the shaft shows visible gold. The ledge is large and hundreds of tons of milling ore are blocked out. A gasoline hoist is being used in sinking.

Ore is being sorted for shipment on the dump of the Last Chance mine owned by Sieson and Roderick. The ore is galena carrying high values in silver.

Captain Alliene Case, who is operating property near Iron Point, is sinking a shaft on the ledge which shows good values in gold and silver, principally in silver.

The new gasoline hoist at the property of the Nevada Crown Mining Co. in the Gold Run district, the first to be installed in the district is now in operation. It was put in under the superintendence of J. H. Thomas, manager of the Golconda Copper Co.'s property adjoining. J. H. Playter is manager of the Nevada Crown Co.

### MISCELLANEOUS CAMPS.

**Tobin.**—The Camp Tobin Mining & Milling Co. has been formed to operate five claims and a fraction at Mount Tobin in this camp. The capital stock is \$1,500,000. E. G. Betts and associates are the incorporators. The original strike on this property was made last September by W. S. Hill. Extensive development work will be done and the tunnel, now in 130 ft., will be extended to cut several ledges which show high-grade gold and silver ore at the surface.

**Goldbanks.**—J. A. Schell has discovered what appears to be a valuable gold-bearing ledge on property one mile north of here. The find was made at a depth of 10 ft. The vein is 4 ft. wide and gives average assays of about \$40 to the ton in gold.

**Manhattan.**—The Manhattan Milling Co. recently made its first mill run under the present management on 130 tons of ore from the Shea lease on Union No. 9. The ore averaged about \$170 to the ton. The total returns are not yet available, but will be high.

**Smelter.**—Contracts are to be let this week for work on the fourth unit on the concentrator of the Steptoe plant.

**Bcatly.**—Eight feet of ore running \$17 to the ton has been opened up on the property of the Taylor Bullfrog Co. in the Gold Gulch section about eight miles east of this place. It is the intention of



President W. S. Taylor to place a 50-ton mill on the property. The process will be a new one.

**Seven Troughs.**—The new board of directors of the Seven Troughs Mining Co. has decided to erect a new mill which will be used exclusively for the treatment of ores from this company's property. To determine the capacity of the new mill and what method of treatment will be required by the ores, about 50 tons of ore will be tested at the Kindergarten mill and at Seven Troughs. With the mill in operation no ore will be shipped.

## NEW MEXICO.

### Jicarilla.

At this gold camp in Lincoln county renewed activity is being shown. Development work is going ahead and new properties are being opened.

The Wisconsin Milling & Smelting Co. will resume work at its mill as soon as necessary changes are made, meanwhile development work is being pushed. On the Murphy claim of this company a large body of good ore is ready for milling.

At the Honey Bee property, Manager Fox is prospecting with a diamond drill for the continuation of a copper vein.

Leasers on the property of the American Placer Co. in Ancho gulch are sluicing dirt running from \$20 to \$25 per cu. yd. Their success attracted attention, and new arrivals were coming in as soon as the news of their first clean up had spread.

The main shaft on the Collector group of the Revenue Gold Mining Co. is in ore. Assays and pan tests show gold practically from the surface. At 75 ft. an ore shoot carrying copper and gold was cut. A new whim is being installed and Manager W. A. Franklin is pushing the sinking of the shaft to the 100 level.

The management of the Old Abe mine at White Oaks has leased below the 200 level.

The owners of the North Homestake have taken a lease on the South Homestake and are working both properties. The compromise is still closed on account of litigation over the estate of the late owner.

## OREGON.

### Grant's Pass.

Work has been resumed on the Blue Ledge mines of the upper Applegate district. The properties are located on the Oregon-California line, and are owned by New York people. C. S. Towne is manager. A force of men has been placed on the property, continuing the development begun two years ago. Men will be added as fast as needed. The company intends to have the mines well developed by next spring, at which time a large smelter will be installed. Since the present company acquired the Blue Ledge about \$600,000 has been expended in sinking shafts, general prospecting work, and driving tunnels and drifts. In addition to this the company has installed a modern water system, which supplies plenty

of mountain water for the camp, both for domestic and fire protection purposes. A number of offices and residences have been built. Daily stages reach the camp from Medford. The Blue Ledge Co. is planning to place a smelting plant that will cost \$1,000,000. It will be located at or near Joe Bar, about two miles below the main camp, to which the ore will be conveyed by gravity tramway. Besides the building of the smelter, the company is also contemplating the building of a railroad connecting the camp with the main Southern Pacific line, either at Medford or at Grant's Pass, the exact route not yet having been determined.

The Black Butte quicksilver mines of the Calapooia Mountain district are now in operation and mercury is now being shipped. The first carload left the mines this past week and other shipments will be made regularly. Both the new reduction plant and the mines are proving very successful. The Black Butte properties are the deepest developed and best equipped cinnabar mines on the Pacific coast. They have been under constant development for the past 10 years, and under one management. There is over five miles of tunnels, raises, shafts and winzes. Hundreds of thousands of tons of ore is blocked out. The great smelter is completed and in operation day and night. Black Butte mountain, on which the mines are located, rises to an altitude of almost 3,000 ft. The whole mountain is practically one huge mass of cinnabar. The main vein is 400 ft. wide and has been opened for a considerable distance into the mountain. The development of the property and its equipment with a reduction plant suited to the particular requirements of the ore has been expensive, but it is believed that it will soon take rank among the largest quicksilver producing mines in the world. The reduction plant differs from all other cinnabar reduction plants known. It is a patent worked out by Manager W. B. Dennis, wood being used for fuel instead of coke. It will be built in 80-ton units, this one being the first. Additional units will be installed as work progresses. The company expects to place other furnaces at once, so that the capacity will be increased to 500 tons per day.

Longwell & Son have uncovered a 5-ft. ledge in the Applegate district near Provoit, 12 miles south of Grant's Pass, that carries values of from \$50 to \$200 to the ton. Some of the ore is thickly shot with gold, and runs higher. It is one of the richest strikes made in southern Oregon this season. The ledge has been traced for a long distance on the surface. Several claims have been located and the property will be deeply developed. The discovery was made but a short distance from Williams creek, where Harris brothers made their rich strike last March. The Harris claims are under development and are proving very rich. Both strikes were made on old districts and on ground that has been prospectured for the past 50 years, until recently, however, all prospecting has been done for placer rather than quartz ground.

A tract of 600 acres of mineral land, located near the railroad in Douglas county,

has been purchased by a Minnesota company, of which W. H. Miller and P. A. Eva are managers. The company will begin the development of the property at once. The land is desired particularly for its placer gold and sandstone. Included in the tract is a mountain of sandstone of good quality. This will be quarried in great quantity. Right of way for a spur track from the quarry to the main line of the Southern Pacific has already been secured and the sandstone will be removed by the train load.

## SOUTH DAKOTA.

### Deadwood.

The Homestake Mining Co. has commenced operations in its new regrinding plant by which it expects to save after the cyaniding process 85% of the value of the mill pulp. Heretofore the company has been obtaining but 50% by the ordinary cyanide process. The tailings come to the regrinding plant from the stamp mills and are separated in 28 classifying cones of two sizes. The separated granular material is passed from the cones to the regrinding machines, which consist of seven Wheeler pans and one tube mill of the type used in South Africa, the cobble stones for which are imported from Belgium. The total capacity of the new plant, which is only working three pans as yet, is about 200 tons daily for the present and the average value of the material treated is \$3 per ton, but will vary with the ore. The proportion of this material is one ton to 13 tons of ore. The 200 tons of material is obtained from the 2,000 tons of ore that passes daily through the stamp mills. The extra 35% that the company has demonstrated by a number of exhaustive tests that it can save by the regrinding plant, will amount to about \$210 per day of 24 hours, or a total saving of approximately \$75,000 per year. The company has also put up a new clarifying house where the water used in the slime plant in Deadwood is cleared constantly after passing through the mills and results in a great saving of water. The Homestake is the first of the companies to employ the tube mill on a large scale. The Mogul Co. has operated one with considerable success for several months past and it is not unlikely that other companies in this section will now adopt the same process.

The Black Tom Mining Co., operating on Slate creek in the Redfern district, is developing its property and preparing to use its 10-stamp mill. The ore veins opened to date are 30, 15 and 10 ft. wide; the ore all being of high-grade character and apparently of permanency. The mill has a 70-hp. engine and is receiving a 100-hp. boiler. The main shaft has been sunk 75 ft., and the vein widens with depth. The property is owned by D. A. Ford and associates of Hill City who are now engaged in raising funds to continue work on a larger scale.

R. T. Walker, who has just purchased a receivership sale at Keystone, the property of the Extreme Gold Mining Co., is organizing a company and is planning to recommence operations on the ground. The Extreme has a large body of ore.

plenty of which is high grade, and, mined and milled with the lower grade material, gives a good average of ore. A 10-stamp mill and other buildings are on the property.

The Westinghouse Electric Manufacturing Co., of Pittsburgh, Pa., is busy with the production of mica near Custer. The company is now employing over 100 people in its plants and factories at Custer. The shaft is down 200 ft., the mica being taken from the 200 level where there is a vein 40 ft. wide, the outcropping of which extend 800 ft. across the ground. This ledge is 6 ft. thick. The company is now shipping 150,000 lbs. of mica each week to the main plant at Pittsburgh. It is operating two mines, the New York and the White Spar, both near Custer, and using an air compressor and air drills. Superintendent Pyne has commenced the erection of a new 600-hp. electric plant for the company. This plant will be operated by coal, doing away with cord wood fuel.

## UTAH.

### Sah Lake.

The Silver Crown Mining Co., which owns two groups of claims covering over four miles of a large highly mineralized quartzite dike in northwest Tintle has begun development work on its property. Work was started on the Silver Colorado No. 4 claim. The vein has been stripped for nearly 200 ft. and considerable \$30 ore is exposed. The vein will be opened at a depth of 100 ft. by a short tunnel now being driven. Work is to be started at once on the Silver Star No. 2 claim to prospect the surface, and another force will start to open up a streak of galena on the Silver Colorado No. 9 claim. M. L. Snow is manager.

The King David Mining Co. is getting its property in Beaver county in shape for active mining. Between 60 and 70 men are at work, which number, it is expected will soon be increased to 100. Five miles of water pipe is being laid from the springs to the mine. A large building to be used as a compressor house, engine house and blacksmith shop is to be erected. Grading is being done for a galloos frame. David Evans is manager.

A body of high-grade ore was recently opened in the slope from the 1,600 level of the Lower Mammoth mine. Work has been resumed on this ore body and it is reported that there is no decrease in either values or size of the body. The values are in gold, silver and lead. A C. Ellis is president of the company.

The Orphan Boy Co., which owns a group of claims just north of the Red Warrior mine in Beaver county, is working on the same vein in which the Red Warrior recently opened a body of sand carbonate ore. Assays of samples show values of from 37 to 45 ozs. silver and from 50 to 57.45 lb. lead. Considerable of this ore from the tunnel is being saved for shipment. C. A. Doe is secretary of the company.

### Eureka.

The North Cliff Mining Co. is making preparations for the resumption of work at its property. Considerable silver-lead

ore is exposed and shipments will be made as soon as a contract is made with the smelter. Frank Thornberg is president and manager of the company.

Crosscutting on the Southern Swansea property will not be begun until the shaft reaches a depth of 150 or 200 ft. It was at first the intention to crosscut on the 100 level, but on account of the excellent showing at that point the management decided to go deeper. A stringer of ore in the shaft assayed 19 ozs. in silver, \$3.50 in gold and about 2% lead. Ernest Higginson is in charge of the work.

## WASHINGTON.

### Republic.

Considerable excitement is reported to have been caused by a rich strike of gold ore in the Beecher mine at Orient. The find was made at the bottom of a shaft now down over 100 ft. The quartz carries free gold and is said to assay very high. The working force at the mine has been doubled and it is the intention to take out ore for shipment at once.

The Silver Queen mine on Ricket mountain in the Kettle Falls district is now turning out good ore. The property is owned by the Ark Group Mining & Milling Co. of British Columbia. Work has been going on steadily on the Silver Queen ever since machinery was installed early this year. Several rich ore bodies have been broken into, which carried high values in gold, silver and copper. Three parallel veins cross the property, the outcrops showing visible values. J. J. Budd is president and manager.

The July property, formerly the Star, in Stevens county, about nine miles east of Boundary, has been relocated by E. F. and F. Z. Alexander. Considerable good galena ore has been taken from the surface. The vein is 30 ft. wide. The mine is in a heavily-timbered country and there are good roads connecting it with the railroad. The property will be extensively developed.

At the Globe mine in the Orient district new ore bins are being constructed for the ore which has accumulated from the development of the property.

The X-Ray group of claims, on Mineral hill, has been bonded to a strong company.

A 2-ft. vein of high-grade Galena ore has been uncovered in the Last Chance mine, on Deep creek, in Northport district, at a depth of 70 ft.

In Chewelah district the Jay Gould mine is being opened below the 100 level. The shaft will be sunk to the 200 level. At a depth of 150 ft. a blind lead was encountered, which has proved to be 25 ft. wide, and the ore extracted from it assays about \$9 to the ton.

In the Metaline district the Spokane Lead Mines Co.'s concentrator is running steadily and satisfactorily.

On Granite mountain, east of Box canyon, in the Metaline district, a 6-ft. vein of copper ore has been discovered.

The lower tunnel on the Night Hawk group in Okanogan county has run into a fine body of ore 1,200 ft. from the portal. The tunnel had followed the vein for a long distance without any important

result, but the last 60 ft. of the tunnel is in pay ore. A crosscut shows the deposit to be 10 ft. wide. The ore assays well in silver and lead, with occasional traces of copper. The company is backed by Ohio capital and has about 100 claims in a group.

Monroe Hartman, manager of the Ruby mine, at the base of Mt. Chopaca, who has been in the east on business with reference to building a mill on the property, has returned and resumed work, and is getting ready to ship some of the first-class ore.

The Prize mine, near Oroville, about a quarter of a mile from the Victoria, Vancouver and Eastern railway and one mile east of the Ruby has large reserves of ore which will pay to ship. It has also veins of very rich silver ore. The mine is owned by the Prize Mining & Milling Co. of Seattle.

The Kelsey group of 15 claims, has been surveyed for United States patents by S. H. Richardson, deputy mineral surveyor, of Republic.

A new strike has been made by Superintendent Wolf in the main tunnel in the United Copper mine in the Chewelah district, of an ore body in what was thought to be the foot wall. The new ore body runs parallel with the vein that was being explored and is separated from it only by a thin wall of shale. The ore assays 7% copper with 41 ozs. of silver.

## WISCONSIN.

### Benton.

The Fox Mining Co. has closed down for the time being for repairs to boilers and machinery. When these have been completed work will be resumed in three shafts. The miners are working on a sheet of lead ore 8 in. thick and a 15-in. sheet of zinc ore.

The Little Mine Mining Co. has completed the sinking of its shaft and is in 7 ft. of ore-bearing ground, two flat sheets of high-grade zinc ore making in a bed of tift, above which is a heavy sheet of lead ore of cog formation.

The Pittsburgh Benton Mining Co., operating through shaft No. 1, has the best showing of both lead and zinc ore which this company has so far uncovered. A continuation of the sheet which made such a fine showing a year ago, is opened up again, revealing a sheet of high-grade black jack, 15 ins. thick. From three to four tons of lead concentrates are recovered almost daily. The mill is somewhat handicapped on account of lack of water, but this difficulty is to be overcome by the installation of the Smedley steam head pump, installed in a 6-in. drill hole, a few hundred feet north of the mill. The grizzly recently installed in the derrick, enables the company to reduce the cost of production of ore to about \$8 per ton.

It is said that the machinery installed upon the Penna-Benton will be removed from this property and in all probability, will form part of the surface equipment intended for the Drum lease.

The Forcite Mining Co. has just completed the installation of two 8-in. cross-head lift pumps set on a solid steel frame,

the first of its kind to be installed in this district. Considerable ore was met with in the sinking of the shaft upon this property, but the water flow was too strong for the first equipment of machinery.

The Lowery mine, located between the Pittsburg-Benton and the Corr, is operating in a strong sheet of drybone, which carries considerable lead ore, affording a profitable milling proposition.

The Lake Superior Mining & Milling Co. will resume operations after a shut-down of several months.

#### Hazel Green.

The Scrabble Creek Mining Co. has just completed the installation of additional pumping power and will finish the sinking of the main shaft, there being about 12 ft. more to go. This property is owned by A. O. Fox of Madison.

The Mills Mining Co. is operating full blast with 50 men on the pay roll and is making 250 tons of green concentrates weekly, which is being shipped to the Mineral Point Zinc Co. Frank Nicholson is in charge of the Mills, which is a part of the recently organized mining corporation known as the United Zinc Co.

The Vinegar Hill Mining Co., after a shutdown of two weeks, is again operating both above and underground. Repairs to machinery was the cause of delay.

The new mill equipment at the Kennedy was put into commission this week and is turning out a large quantity of concentrates.

#### Highland.

Shipments out of the camp for the last week amounted to 150,000 lbs of carbonate zinc ore, two cars being shipped by the Highland and two by the Franklin.

The Milwaukee-Highland mill equipment is now in operation, treating ores from the Walnut mine.

The Minter Mining Co. has just installed a 4½-in. Downie deep-well pump. The well is over 400 ft. deep and will furnish a supply of water sufficient for milling purposes.

The Franklin Mining Co. is milling again and turning out from 15 to 20 tons of high-grade carbonate zinc ore daily. The motive power which operates this mill is furnished by a 40-hp. Fairbanks, Morse & Co. gasoline engine equipped with an oil feed for kerosene oil. The engine is first started with gasoline, and after being heated, the oil attachment is brought into use, furnishing the most economical power to be found anywhere in the field.

#### Mineral Point.

The Mineral Point Zinc Co. has been purchasing separator ore very heavily lately, which is being shipped to De Pue, Illinois. The ore is first used in the acid department of the works, the residuum being used in the manufacture of spelter. Recent purchases will average about 300 tons weekly. The zinc-oxide establishment at Mineral Point is being operated night and day and large shipments of zinc oxide are made daily.

#### Platteville.

Nearly all of the properties belonging to the Wisconsin Zinc Co. are at present shut down and more than 100 miners are out of employment.

## WYOMING.

#### Laramie.

The greatest activity at present is in the Centennial, Holmes and Lake Creek districts west of Laramie. A large factor in this no doubt is the operation of the Laramie, Hahn's Peak & Pacific railroad, within easy reach of these claims.

Some large bodies of low-grade gold and copper ore are now being opened on the summit and west slope of Centennial mountain.

The Lake Creek district, 12 miles south-west from Centennial, is very promising and the considerable development already done, show ores carrying good values in gold, copper and other valuable minerals.

A strike was recently made in the Polloyton shaft in the Lake Creek region, of a large body of copper pyrites running 15% copper and carrying values of from \$20 to \$30 to the ton in gold and silver. The ore was struck at a depth of 20 ft. and is believed to be permanent.

The American Gold Placer Co. has its dredging machinery in place on Douglas creek and will soon begin operations.

Harry Milnor has cut the lead on the 100 level of the Iron Clad group at Willow creek, and has entered it 6 ft. without finding the opposite wall. Assays from the lead give 163 ozs. in silver, \$18 in gold and 3% copper. This is the highest value in silver yet obtained in the district.

Development work is to be continued on the Jessie group at Hog Park under the direction of C. B. Henderson of Alma, Kas. The ore has good values.

Plans are under consideration for the pushing of work on the Indicator property on Douglas creek, but it is probable that the property will first be examined by the state geologist, and the decision regarding the work will depend on his report.

## CANADA.

### ONTARIO.

#### Cobalt.

Shipments for the week ending Aug. 29 amounted to 569 tons and the total for the year to 13,815 tons. The shipments were as follows:

	Week Aug. 29.	Year 1908.
	Lbs.	Lbs.
Buffalo .....	91,000	848,660
City of Cobalt .....		775,110
Conings .....		781,160
Cobalt Central .....		279,990
Cobalt Lake .....		242,568
Cobalt Township .....	40,000	351,775
Crown Reserve .....		195,681
Drummond .....		354,490
Forster .....		178,400
Kerr Lake .....	61,000	673,244
King Edward .....		602,760
La Bore .....	414,000	5,507,690
Little Nipissing .....		81,247
McKinley-Jarvis .....	61,000	2,212,080
Nancy Helen .....		266,047
Nipissing .....		3,329,067
Nova Scotia .....	40,000	351,775
O'Brien .....	191,000	4,497,087
Provincial .....		161,680
Right of Way .....		779,890
Silver Cliff .....		53,000
Silver Leaf .....		258,110
Silver Queen .....		1,132,870
Temiskaming .....		628,460
T. & H. B. .....	120,000	952,920
Tretheway .....		1,787,610

The litigation in connection with the

Hargraves property has been settled. The title in the property is to go to E. R. C. Clarkson and the Canadian government is to receive 25% royalty and the costs. This claim adjoins the Kerr Lake mine on the south.

At the 210 level of the Nipissing a rich vein of calcite and native silver has been found. This is in the Keewatin formation. On the west drift on the Meyers vein, at the 100 level, a 4-in. vein of high-grade ore was found.

The Frazier Diamond Drill Co. is to do considerable drilling on the Silver Leaf property.

Work on the Silver Bar mine has been suspended pending reorganization. The property is looking well, one vein of solid smaltite 3 ins. wide and another of calcite and native silver having been found and worked.

Plans for a concentrator for the Trethewey are being drawn up.

It is estimated that there is \$3,000,000 worth of ore practically in sight now on the Crown Reserve, between the cut and the main shaft. There is \$150,000 worth of high-grade ore in the ore house.

Work has been suspended on the Casey-Cobalt for six weeks.

At a depth of 200 ft. on the City of Cobalt a vein of high-grade ore 10 ins. in width has been found. A 10-drill Sullivan compressor has been purchased. Until now power has been obtained from the Cleveland-Cobalt.

The first shipment was made from the Chambers-Ferland property last week of 30 tons of ore to Denver, Col. No. 1 shaft is down 100 ft. and the vein is being drifted on in both directions. At a depth of 80 ft. in the No. 2 shaft cross-cutting to cut several of the parallel leads has been started.

At the 100 level of the Little Nipissing the crosscut has struck a vein of high-grade ore 13 ins. wide, running high in silver. This is the vein on which the shaft was started, but it dipped out at 70 ft.

The Youngstown Cobalt property is situated on the west shore of Sasagininga lake. Work has been started with 15 men. Mr. Floyd Harman, late superintendent of the Temiskaming, is in charge.

The plant of the Montreal Smelting & Reduction Co. at Trout lake is rapidly approaching completion. Sufficient capital has been obtained for operating expenses. It is expected that the cobalt-silver-arsenic ores of this camp will be treated at less cost and a greater saving than has hitherto been possible.

The past few weeks has seen a very decided betterment in conditions in the Montreal River district. A number of important and encouraging developments have attracted many investors. Several deals have been made that will result in a decided increase in activity.

The announcement that a very rich vein of smaltite and silver had been encountered in the tunnel on the Gars property has created more interest in mining circles in this vicinity than any development since the first discovery of

silver near Elk lake. The property, which consists of 40 acres near the Montreal river, about one mile north of Bear creek (Smyth township), was sold this spring to a syndicate of Toledo and Detroit capitalists, by Herbert Gates. When the new management took over the property the only development consisted of a pit from 10 to 12 ft. deep, which had been sunk by Mr. Gates on a vein of decomposed calcite. From this pit Mr. Gates took over 500 lbs. of nuggets, which averaged over 65% silver. These nuggets were found free from the vein matter in a decomposed muck. At the bottom of the pit the vein filling was red calcite carrying very little silver. As the vein was found on the top of a small hill and several smaller veins were located on the slope of the hill, it was decided by the new management to develop the big vein by running a tunnel in from the side of the hill. At 36 ft. the tunnel cut a vein of calcite and smallite running at right angles to the main vein and a drift was started on this vein. At a point 60 ft. from the No. 2 vein, or 96 ft. from the mouth of the tunnel, the main vein was encountered. At the junction this vein showed 4 ins. of smallite, calcite and silver. A drift 120 ft. long has been driven, at least 33% of which is a very high-grade ore.

## BRITISH COLUMBIA.

### Rosland.

The mines of Rosland camp are maintaining a good output for the present times and the ore at all of the big producers is showing up strong.

The shipments of ore from the camp for the week ending Sept. 3 and for the year to that date were:

Mine.	Week		Year
	Aug. 22.	Aug. 29.	1908.
Tons.	Tons.	Tons.	Tons.
Centre Star .....	3,440	3,149	117,370
Le. Hol .....	1,310	1,586	54,065
Le. Hol 2, Ltd. ....	560	682	17,254
Evening Star .....	35	36	683
Homestake .....	...	...	25
Curlew .....	...	...	30
Mayflower .....	...	...	35
Blue Bird .....	...	...	145
Red Eagle .....	...	...	20
Summit .....	...	...	25
Giant-California ..	...	...	95
St. Bruno .....	25	...	25

### Phoenix.

It is given out on good authority that a company is now being formed in the east for the purpose of developing the Gray Hound group of claims adjoining the British Columbia Copper Co.'s and the Dominion Copper Co.'s properties near Greenwood, and also for the erection of a modern smelter to treat the ores from the above group.

J. C. Haas of Spokane, Wash., is calling for tenders for a large amount of development work on the Buell group of claims.

N. Mulligan, while looking over the No. 16 claim north of the Granby properties, discovered a fine showing of magnetic ore and has uncovered it twenty feet wide for a distance of 100 ft. It carries good values in copper and gold.

Since the strike of high-grade ore was made on the Mother Lode a short time

ago, owners have done more development work on their properties.

The British Columbia Copper Co. is dealing for another large group of claims and it is learned that it intends to double the capacity of its smelter in the near future.

Shipments of ore from the Granby mines during the past week or two have dropped to a low level, principally owing to a shortage of coke. While the large companies had a 3-weeks' supply of coke on hand at the time of the Fernie fire a regular supply has not started to come in yet and as a consequence there is a slight shortage. But four of the battery of eight furnaces at the Granby smelter have been in operation for the past two weeks. Five furnaces are now burning and the other three will be available as soon as there is sufficient fuel on hand to feed them steadily.

Mining operations have been resumed at the Brooklyn and Rawhide mines of the Dominion Copper Co. and the large furnace at the smelter will be blown in in a day or two.

About 40 men have been employed at the Snowshoe property of the Cons. Co. getting things in shape for active mining work. While copper remains at its present low price a supply of Snowshoe ore for fluxing purposes only will be shipped to the Cons. Co.'s smelter at Trail, but development work will be kept well advanced in anticipation of heavy shipments when the market price of silver and copper is stronger.

The British Columbia Copper Co. has not been affected to any extent by the Fernie fire and it has been maintaining steady operation. The coke now used by the British Columbia Copper Co. is obtained from the International Coal & Coke Co.'s ovens at Coleman, Alberta. The Granby Co. is negotiating for a supply of coke from this company.

The following are the ore shipments from this district for the week ending Aug. 22 and Aug. 29 and for the year to and including the latter date:

Mine.	Week		Year
	Aug. 22.	Aug. 29.	1908.
Tons.	Tons.	Tons.	Tons.
Granby mines .....	15,769	12,471	686,815
Mother Lode .....	9,374	10,492	118,731
Uro. Tenorio .....	3,220	1,280	27,848
Rawhide .....	1,290	1,220	12,030
Brooklyn .....	650	160	6,434
St. Bruno .....	367	...	367
Sunset .....	363	...	3,902
Mountain Rose .....	140	...	665
Abolition .....	120	...	120
Sally .....	22	...	121
Greenwood .....	...	...	50

G. P. Jones, superintendent of the Nickle Plate mine, at Hedley, has an option on the Golden Zone near there, for \$65,000. The Golden Zone is a gold mine and there is a 5-stamp mill, with 10-stamp equipment at work on the property.

Chas. Cammell, Dominion geologist, returned to camp from the Similkameen a few days ago, where he has been looking over the mining country. Topographical work is now being executed by the Survey in the Upper Tulameen district. This is a platinum-bearing zone.

The Apex mine on Independence mountain, which was under bond to the British Columbia Copper Co. three years ago, has been bonded by W. D. McMillan.

There is a good body of ore in sight on this property. Development work is to be continued on the Fortune. Extensive operations are to be commenced on the gypsum deposit known to exist on the main line of the Canadian Pacific railroad, near Spence's Bridge.

## MEXICO.

### Oaxaca.

Sampling is being continued on the Rio Seco prospects, near Parian, and good gold values are shown from the assays.

The management of the San Juan mine in Taviche has decided to sink the shaft 100 ft. deeper. The present depth of the shaft is 525 ft. The ore body, which has been followed down from the surface was found to have increased in size on the 525 level and it has been decided to open it on the 625 level as well.

The Zapote mine in Taviche continues to produce, but owing to the low price of silver no shipments are being made. The lower-grade shipping ores are being put on the dump and the higher-grade sacked and stored. There is at the present time about 100 tons of high-grade ore on hand at the mine.

The Natividad Mining Co. has installed its own assay office in the city. The laboratory has been fitted up regardless of expense.

Owing to the few heavy falls of rain that have taken place during the present rainy season, now nearly over, very little damage has been done to the roads in the mining camps. Generally there is considerable delay in the transporting of ore and machinery during the rainy season, owing to the damage done to roads by the heavy rains.

The pay streak in the Duende mine in Taviche has widened from 12 to 24 ins. This ore is coming from the bottom of the antigua workings, which have just been cleaned out. A shaft is now being sunk to get under this ore body.

There is now little question but that the Oaxaca Smelting Co. has arranged for the handling of the low-grade copper ores from the Ocotines mine. This property belongs to the Tezuitlan Mining & Smelting Co. and heretofore the ores have been going to the company's own smelter at Tezuitlan for treatment, but, with the opening of the smelter here, it will be more economical for them to send the low-grade ores to Oaxaca. This will also solve the question of a flux for the smelter company.

The Tezuitlan Mining & Smelting Co. has begun taking over a number of copper prospects in the Ejutla district and the work of developing them is going ahead rapidly. This move has given considerable impetus to the industry in the Ejutla copper district and work at a number of properties has been begun.

The American Banking Co. of Boston has purchased the Santa Catarina mines on the north slope of the Chivo mountain in Taviche. The property belonged to Rickards brothers of this city, and was under option to Maurice Clark. The mine is one of the first to have been opened in Taviche and has been developed by tunnels and upraises. The Jesus Maria tunnel is 185 meters long

There are extensive workings on each side of this tunnel. The Santa Cruz tunnel is 120 ft. lower down the mountain and is 155 meters long, while the lowest tunnel is known as the San Miguel, 500 ft. below the surface, and is 200 meters long. In the entire mine there is more than 10,000 ft. of work.

The Rosario mill in the Penoles district is being moved to Cuatro Amigos, eight kilometers distant. The change has been made necessary by the increasing of the capacity of the mill requiring more power than is given by the river at the old site. An average of 112 hp. will be developed at Cuatro Amigos. An aerial tramway will be built to connect the mine with the new mill site.

The Cia. Minera Georgina, an American company, has been formed under Mexican laws to operate the Georgina property in the Parian district.

The Oaxaca Investment Co. has purchased the Santiago y Anexas in the Taviche district and has also taken a bond on the Maria mine in the San Jose district.

R. H. Leadley, general manager of the Cons. Metals Co., in Mexico, stated last week that all arrangements had been completed for the completion of the Taviche railroad, and that the actual work of getting the roadbed in shape will be begun within a month. This will connect Oaxaca with its camp and will have the effect of starting a large number of prospects and will make possible the shipments of large quantities of ore that could not be handled previously owing to high transportation charge. Most of the roadbed has been completed and a portion of the steel is already in place.

The Socorro Mining Co. has decided to erect a stamp mill on its property in the Nochistlan district and the machinery is now being purchased for the plant.

During the last few days the Oaxaca Coal & Iron Co. has taken up 415 additional claims covering iron deposits in the Mixteca region of this state, which gives this company a total of over 1,000 claims. A force of 30 American engineers and diamond drill men is engaged in prospecting the iron and opening up some coal deposits in the same region. The last denunciations made by the company were in three groups. Fifty claims were taken up at La Ferreria, in the district of Putla. The property has been named "Ahada." Forty-eight claims were registered in the municipality of Ixtudinia, in the same district, and the property has been named "La Preferida del Presidente." The largest of the denunciations was made in the municipality of Calhucua, in the district of Nochistlan. This block contains 317 claims and was named "Porfirio Diaz Hijo Anexas." All of the claims cover deposits of iron. It is stated that the company intends to build a railroad into the district in the very near future.

Another option has been given on the famous Mimilga mine in the San Jose district and it is probable that the property will pass into the hands of an American company.

The shaft on the Palmilla mine in the San Jose district has reached the 200 level and the crosscut to the vein has

been started. It is expected that the vein will be encountered at a very few feet from the shaft.

The documents for the protocolization of the new smelter company are expected to arrive in the city this week from Boston, where the final arrangements have been made for the operating of the smelter here in the near future.

#### Cananea.

It seems to be practically settled that work on the long proposed extension of the Rio Grande, Sierra Madra & Pacific railway will be under way by Dec. 1, \$500,000 having already been secured and there is every indication that the remainder will be easily subscribed. The road will skirt the northern edge of the mountain, and join the Nacozari railroad at Cos, passing directly by the El Tigre mines. One of the richest mining sections of Mexico will be opened up, and splendid facilities for transporting ores to the El Paso smelter will be given. This road is greatly desired by the Mexican government and every possible encouragement is being extended by it to the builders.

Several changes have been made at the Moctezuma-Arizepe recently, and a new impetus has been given the work there. F. H. Wilhelm has been succeeded as general manager by J. J. Evans, who was formerly identified with the Cananea Cons. Copper Co., but more recently with the Espiritu Gold Mining Co. as president. Wilhelm has had charge of the mine for nearly six years. Mr. Evans expects to begin the extraction and shipment of ores at once and will employ more men than heretofore.

J. P. Casey of the Carmen Mining Co. states that the property looked better, and the prospects of more extensive work brighter than ever before. At the present time only 15 men are employed.

The Calumet & Sonora Co., near Cananea, has gradually increased its working force after working continually throughout the depression. Irregular shipments of ore to the El Paso smelter have been made since last November, but hereafter the entire output will be diverted to the smelter of the Greene Co., which announces its acceptance of custom ores.

Chas. A. Romodka and H. C. Stillman have been appointed by the Douglas, Ariz., Chamber of Commerce to visit the mining camps to Sonora to arouse interest in sending ore exhibits to the Mining Congress at Columbus, Ohio, and to the Albuquerque Irrigation Congress. They will seek the aid of both the large and small companies and it is almost a certainty that this section will have exhibits at both meetings. It is hoped thereby to aid Douglas in securing the Mining Congress in 1909.

The management of the Moctezuma mine, just across the line from Naco, Ariz., is contemplating the erection of a stamp mill.

A meeting of the Southwestern Mining Co. has been called for Sept. 15 in Naco, Ariz., to consider the proposition of selling the entire assets of the company to the Cananea-Kansas Mining Co.

The Old Moody mine, in the Ajo

mountains east of Cananea, has been bonded to Cananea people, who expect to organize and develop the property.

Two bars of gold weighing 200 lbs. each were shipped from the Cerro Prieta mine last week.

The mining costs of the Cananea Cons. Copper Co. for July was probably a great deal lower than the published statement will show. This is due to the costs of several non-producing mines, including the Capate, which are being developed at considerable expense, with no intention of extracting ores for several months. The labor costs have been reduced greatly by eliminating American mines altogether. None but domestic labor is now employed underground by the Greene Co.

#### Guadalajara.

E. H. Gregory, general manager of the San Carlos gold mines in the Mezquital del Oro district of Zacatecas, is in Guadalajara on his return to the mines after a business trip to England. Mr. Gregory states that since ore running 12 ozs. gold to the ton was cut in the San Carlos mines, another rich strike has been made, some of the ore assaying as high as 1,000 grams gold to the ton. This is the richest ore ever secured in the Mezquital district. As soon as Mr. Gregory reaches the mines development work, which has been practically at a standstill during his absence, will be resumed on an extensive scale, and the extent of the rich ore will be determined. Some time ago the sale of the mines was considered, and an option was given to people in the republic, but the recent rich strikes have resulted in a change of sentiment, and, as the option has expired, the sale of the mines is now by no means probable. During the coming dry season it is likely that the hydraulic works necessary to enable the San Carlos Co. to use the water of the Mezquital river in the operation of its 50-stamp mill will be carried out. Steam is now used, and the utilization of the water power will effect a big saving. Later a hydro-electric plant may be installed and the water power used for the generation of electricity.

A letter from L. C. Malone, general manager of the Tajo mine in the San Sebastian district of Jalisco, tells of the cutting of 4 ft. of ore averaging 1,000 grams silver to the ton. The ore was cut by the upper Tajo tunnel, which is in over 500 ft. Mr. Malone states that the machinery for the proposed reduction plant at the mine has been ordered in the United States, and that the reduction facilities will be installed during the coming dry season. The plant will consist of stamps, concentrators and a cyanide annex. The capacity will be at least 50 tons daily. The Tajo mine is the property of the Tajo Mining Co. of New York.

With the object of providing mine timber for the future, the Amparo Mining Co. of this state has decided to engage in the growing of eucalyptus trees. A forest will be established on the company's Embocada ranch in the Etzatlán district under the direction of C. E. Wood of Guadalajara.

## Corporation Affairs and Finances.

The information appearing on this page is published gratuitously for the benefit of subscribers to The Mining World who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and brokers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The East Butte Copper Mining Co. has established a Boston office in Room 1109, Postoffice Square building.

The Bezan Gold Mining Co., with properties in Leavenworth Gulch, Russell district, Gilpin county, Colo., has opened offices at 408 Temple court, Denver, Colo.

There was a sale at auction at New York recently of 4,167 shares of San Gregorio Mining & Railway Co. at \$7 for the lot, and of a \$1,000 first mortgage bond of the Dawson Railway & Coal Co. at 90.

The creditors of the Butte Central & Boston at Butte held a meeting in bankruptcy proceedings. Claims aggregating \$158,000 have been presented, of which \$30,000 are preferred. One of the claims is that of the Tri-National Corporation of Boston, for \$53,000. The creditors have not yet agreed upon a trustee.

Geoffrey Lauzier, formerly managing director of the North Butte Extension Copper Mining Co., has brought suit against the company to recover \$5,000 alleged to be due as salary, and the National Mining & Investment Co. sues for \$3,000 alleged to have been cash advanced. Attachments have been placed on the property.

Plans for a reorganization of the Calumet & Butte Co. of Montana, are being worked out. The plan is to organize the Western Copper Co. with 200,000 shares at \$5 par. The old company's stock will be exchanged share for share, and marked \$2 paid. An assessment of 50 cents a share will be called. The old company expended about \$100,000 on development and sunk a 500-ft. shaft.

The Catlin & Powell Co., of New York, is offering for subscription the 6% convertible special contract bonds of the Proprietary Mines Co. of America. The bonds carry an equal amount in par value of the stock of the company. The bonds are convertible into stock. The company has options covering the control of the following companies: Mineral Development Co. of Guanajuato, Mex., Zacatecas Mining & Metallurgical Co., and the United Mining Corporation of Zacatecas.

At the annual meeting of the American Smelting & Refining Co. held in Jersey City, N. J., recently less than 12 stockholders were present. The old board of directors was re-elected and Walter T. Page of Omaha was elected to fill a vacancy, thus completing the board. The management voted proxies representing 557,634 shares of stock. The American Smelting Securities Corporation re-elected the retiring directors. The list of stockholders shows that neither Henry H. Rogers nor any member of the Rockefeller family was on Aug. 1 of the current

year a stockholder of record. J. S. Bache & Co., with approximately 8,000 shares to their credit, had the largest brokerage holdings, while Henry Clews & Co. had about 7,000 shares.

The National Mining Exploration Co. contemplates the issuing of \$250,000 in 10-year 6% bonds, convertible into stock at \$1 per share at any time within two years. The company reserves the right to call the bonds at 105% on 90 days' notice. There is no floating debt and the entire amount will be available for the company's plans for the future. The directors are considering the advisability of changing the par value of the stock which is now \$1 per share. The authorized capital is 1,500,000 shares, of which about 800,000 are now outstanding. The sale of the bonds will avert any necessity for the issuing of more stock except that called for by the conversion of the bonds. The money received from the sale of the bonds will be used to sink a new shaft at the Iron Cap property at Globe, and continue the shaft at the Fumarole property at Safford. It is likely also that a cyanide plant will be erected at the latter property.

### Official Reports.

#### AMERICAN SMELTING & REFINING CO.

The income account for the fiscal year ending April 30, 1908, is as follows: Gross earnings, \$9,403,282, and net earnings \$7,633,287 after deducting \$836,866 for taxes and general expenses, and \$933,129 for repairs and betterments. There was added to the employees' profit sharing fund \$622,096; and dividends were \$3,500,000 (7%) on the common stock and \$2,500,000 (7%) on the preferred. The surplus for the year was only \$11,191, which added to \$13,397,028 brought forward from 1906-7, makes a total surplus of \$13,408,219.

President Daniel Guggenheim reports in part as follows:

"Together with most enterprises in this country, your company has suffered as to earnings. The simultaneous and sudden decline in the value of lead, silver and copper, together with no proportionate decline in the expenses of operating mines, notably freights, supplies and labor, made it unprofitable for many of the various mines under contract to your company to continue their usual output of ore. This had the necessary and inevitable result of bringing down the reduction (in earnings) as shown above. The large surplus, however, already accumulated was not impaired and now amounts to a total of \$13,408,219.

"Preferred stock dividends Nos. 32 and 35, inclusive, and common stock dividends Nos. 15 to 18, inclusive, amounting to \$7,000,000 have been paid regularly each quarter. The directors thought it best

to reduce the dividend on the common stock for the last quarter of the fiscal year to 1%, thus bringing the dividend payments within the net profits of the year, even after charging off against profit and loss the entire amount expended during the year for improvements and new construction.

"There has been completed and added to the property during the last year a lead and copper smelting plant at Chihuahua, Mex., which commenced operations in July, 1908. The entire cost of the construction of this plant has been charged to profit and loss, as has been the universal custom of the company in connection with new construction for the past five years.

"The slight increase in investment account is due to a reorganization of the United States Zinc Co.

"The earnings of the American Smelters' Securities Co. were affected by the same causes as those which reduced the earnings of your company. We are pleased to state, however, that after the payment of dividends on preferred stock for the year ended May 31, 1908, there was a surplus to the credit of profit and loss account of that company of \$33,709. The various smelting plants under construction since the organization of the Securities Co. are now in partial operation and are fast reaching completion.

"There is a marked improvement at the present writing in the market value of copper and lead. The directors feel warranted, therefore, in expecting that the net earnings of the Securities Company for the coming year will not make necessary any further encroachment upon the surplus, and it is not expected, therefore, that your company will be called upon to make any payments under its guarantee of dividends on securities 'B' preferred stock."

The assets of the American Smelting & Refining Co. on April 30, 1908, were: Property, \$86,845,670; investments, \$3,950,988; metals, \$17,519,664; materials, \$1,380,712; net current assets, \$500,726; cash and demand loans, \$5,629,634; total, \$115,825,724. Liabilities were: Capital stock, \$100,000,000; bonds, \$319,000; unearned treatment charges, \$2,068,506; surplus, \$13,408,219; total, \$115,825,724.

#### ST. JOHN DEL REY MINING CO., BRAZIL.

In the last fiscal year the net profit amounted to £70,840 (\$554,200). The production was 156,159 tons, of which 151,154 tons were treated, the average assay value being 46s 6d (\$11.21) per ton. The recovery was 42s 4d per ton in gold, equivalent to about 91%, due partly to the introduction of tube mills, which facilitated the treatment by the cyanide process of an increased quantity of 40 to 50% pyritic ore. The ore reserves are estimated by Superintendent Chalmers at 1,600,000 tons. The company owns about 15,000 acres of iron lands, the ore yielding 60% iron and is almost free from phosphorus. The company also has about 20,000,000 tons of rubble iron ore which contains, it is believed, 0.26% of phosphorus. Preparations are being made to install the necessary equipment to smelt the iron ore.

# Latest Ore and Metal Market Reports and Prices

**Silver.**—Hope is the keynote of the silver market, for the reason that reports from India continue favorable.

The receipts of silver in London for the week of Aug. 27 were £162,500 from New York, and £5,000 from the West Indies; total, £167,500. Shipments were £161,000 to Bombay, £2,500 to Colombo, and £1,500 to Port Said; total, £165,000. According to Messrs. Pixley & Abell the shipments of silver from London to the East from Jan. 1 to Aug. 27 were as below:

	1907.	1906.	Change.
India	\$9,988,500	\$8,296,712	D. \$1,791,788
China	560,000	516,000	D. 44,000
Burma	22,000	20,510	D. 1,490
Total	\$10,570,500	\$8,833,222	D. \$1,737,278

Quotations for silver per fine ounce at New York and standard ounce (0.35 fine) at London, for the week of Sept. 9 were as below:

	New York	London
Sept. 9	51 1/2	51 1/2
8	51 1/2	51 1/2
7	51 1/2	51 1/2
6	51 1/2	51 1/2
5	51 1/2	51 1/2
4	51 1/2	51 1/2
3	51 1/2	51 1/2
2	51 1/2	51 1/2
1	51 1/2	51 1/2
Year	51 1/2	51 1/2

## MONTHLY AVERAGE PRICES OF SILVER.

Month	New York, Fine Oz.				London, Standard.			
	1908		1907		1906		1905	
	High	Low	Average	Average	High	Low	Average	Average
Jan.	51 1/2	51 1/2	51.876	52.646	52	53.750	51.746	51.746
Feb.	51 1/2	51 1/2	52.000	52.826	52	53.921	51.821	51.821
Mar.	51 1/2	51 1/2	52.751	53.419	52	54.258	51.854	51.854
April	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
May	51 1/2	51 1/2	52.751	53.509	52	54.405	51.837	51.837
June	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
July	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Aug.	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Sept.	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Oct.	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Nov.	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Dec.	51 1/2	51 1/2	53.509	55.447	52	54.405	51.837	51.837
Year				52.326				

Differences in domestic and foreign prices is expressed by the fact that the New York quotations are per fine ounce; the London per standard ounce. (.935 fine).

**Copper.**—New business is comparatively small, but prices continue firm as the consensus of opinion is that the market will advance in the near future. Speculative interests have done a pretty good trade recently, and in certain quarters it is believed this business will grow as soon as the larger consumers enter the market.

Exports of copper from North Atlantic ports from Sept. 1 to 4 were 3,338 tons.

Quotations for copper per pound at New York and per long ton (2,240 lbs.) at London for the week of Sept. 9 were:

	Lake	Flow	East	London
Sept. 9	13 1/2	13 1/2	13 1/2	28 1/2
8	13 1/2	13 1/2	13 1/2	28 1/2
7	13 1/2	13 1/2	13 1/2	28 1/2
6	13 1/2	13 1/2	13 1/2	28 1/2
5	13 1/2	13 1/2	13 1/2	28 1/2
4	13 1/2	13 1/2	13 1/2	28 1/2
3	13 1/2	13 1/2	13 1/2	28 1/2
2	13 1/2	13 1/2	13 1/2	28 1/2
1	13 1/2	13 1/2	13 1/2	28 1/2
Year	13 1/2	13 1/2	13 1/2	28 1/2

## MONTHLY AVERAGE PRICES OF COPPER.

New York—Lake Copper.				
Month	1908			1907
	High	Low	Average	Average
January	14 1/2	13 1/2	13 1/2	14 1/2
February	13 1/2	12 1/2	13 1/2	13 1/2
March	14 1/2	13 1/2	13 1/2	13 1/2
April	13 1/2	12 1/2	13 1/2	14 1/2
May	13 1/2	12 1/2	13 1/2	13 1/2
June	13 1/2	12 1/2	13 1/2	13 1/2
July	13 1/2	12 1/2	13 1/2	13 1/2
August	13 1/2	12 1/2	13 1/2	13 1/2
September	14 1/2	13 1/2	13 1/2	13 1/2
October	13 1/2	12 1/2	13 1/2	13 1/2
November	13 1/2	12 1/2	13 1/2	13 1/2
December	13 1/2	12 1/2	13 1/2	13 1/2
Year	13 1/2	12 1/2	13 1/2	13 1/2

## New York—Electrolytic Copper.

Month	1908			1907		
	High	Low	Average	High	Low	Average
January	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
February	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
March	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
April	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
May	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
June	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
July	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
August	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
September	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
October	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
November	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
December	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
Year	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2

Quota (one for electrolytic cathodes are 0.128 cent per lb. less than for anodes, sheets and wire bars).

## N. Y.—Castings Copper.

Month	1908			1907		
	High	Low	Average	High	Low	Average
January	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
February	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
March	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
April	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
May	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
June	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
July	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
August	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
September	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
October	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
November	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
December	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
Year	14 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2

**Tin.**—Consumers are conspicuous by their absence, a fact that has caused prices to ease off appreciably.

The total arrivals of tin at north Atlantic ports for the eight months ending with August amounted to 22,948 tons, while the deliveries were 21,950 tons. For the corresponding period last year the deliveries totaled 26,650 tons, indicating a falling off in 1908 of 4,700 tons, which is equivalent to about one month's shipment from the Straits. The visible supply of tin in the United States on Aug. 31 was estimated at 3,987 tons.

Quotations for tin per pound at New York and per long ton for spot at London for the week of Sept. 9 were:

	New York	London
Sept. 9	9 1/2	27 1/2
8	9 1/2	27 1/2
7	9 1/2	27 1/2
6	9 1/2	27 1/2
5	9 1/2	27 1/2
4	9 1/2	27 1/2
3	9 1/2	27 1/2
2	9 1/2	27 1/2
1	9 1/2	27 1/2
Year	9 1/2	27 1/2

## MONTHLY AVERAGE PRICES OF TIN, NEW YORK

Month	1908			1907		
	High	Low	Average	High	Low	Average
Jan.	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
Feb.	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
Mar.	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
Apr.	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
May	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
June	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
July	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
August	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
September	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
October	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
November	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
December	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2
Year	28 1/2	27 1/2	27 1/2	27 1/2	27 1/2	27 1/2

**Lead.**—Orders generally are small in volume, and prices at New York continue at \$4.55 to \$4.60 per 100 lbs. In London spot Spanish lead sold for the week of Sept. 9 at £13 1/2 to £13 3/4 per long ton (\$2.83 to \$2.86 per 100 lb.), closing at £13 1/2 to £13 3/4 per 100 lb.). English lead is worth 2 1/2 (60 cents) per ton more than Spanish.

Lead ore sales in the Missouri-Kansas district for the week of Sept. 5 were made at \$29 to \$60 per ton.

## MONTHLY AVERAGE PRICES OF LEAD.

Month	New York			London.		
	High	Low	Average	High	Low	Average
Jan.	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
Feb.	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
Mar.	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
Apr.	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
May	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
June	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
July	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
August	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
September	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
October	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
November	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
December	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2
Year	3 1/2	3 1/2	3 1/2	6 1/2	6 1/2	6 1/2

## Joseph Lane Ore.

Month	1908			1907		
	High	Low	Average	High	Low	Average
Jan.	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
Feb.	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
Mar.	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
Apr.	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
May	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
June	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
July	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
August	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
September	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
October	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
November	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
December	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
Year	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2

**Spelter.**—A moderate business is being done at higher prices, namely, \$4.72 1/2 to \$4.77 1/2 per 100 lb. at New York. In London good ordinaries sold for the week of Sept. 9 at £19 1/2 to £19 7/8 per long ton (\$4.18 to \$4.20 per 100 lb.), closing at £19 7/8 to £19 1/2 per 100 lb.).

Zinc ore sales in the Missouri-Kansas district for the week of Sept. 5 were made at \$40 per ton for 63% grade, while the assay basis of 60% zinc was quoted at \$35 to \$37 per ton. Silicate ore of good grade sold from \$18 to \$27 per ton.

## MONTHLY AVERAGE PRICES OF SPELTER.

Month	New York			London		
	High	Low	Average	High	Low	Average
Jan.	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	10 1/2
Feb.	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	10 1/2
Mar.	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	10 1/2
Apr.	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	10 1/2
May	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	10 1/2
June	4 1/2	4 1/2	4 1/2	10 1/2	10 1/2	1





### Latest Quotations on American and Foreign Mining Stocks.

Copper, Gold, Silver, Lead, Zinc, Quicksilver,

(8) Dividend Payers. (9) Levy Assessments

[illegible]

### Mexico.1

Sept. 2

**San Francisco.†**

Sept. 19

**Toronto**

Sept. 13

[illegible]

#### Dividends Declared.

		Per
	Date	Share
*Am. Sm. & Ref. com.	Oct. 15	\$1.00
*Am. Sm. & Ref. pf.	Oct. 1	1.75
*Chalmers & Huch	Oct. 1	1.00
*City of Wash.	Oct. 1	27.00
*Columbia	Oct. 1	1.25
*Copper Range Co.	Oct. 1	1.00
*Copper Range pf.	Oct. 1	3.75
*Crescent	Oct. 1	1.00
*Deerpark, Me.	Sept. 1	.875
*Federal M. & S.	Sept. 15	1.75
*Hague	Sept. 15	1.00
*Homestake, S. D.	Sept. 20	.60
*Keweenaw	Sept. 15	1.00
*Kendall, Minn.	Sept. 20	.02
*Keweenaw	Sept. 15	1.00
*May Day Utah	Sept. 21	.25
*May Day pf.	Sept. 21	1.00
*National Lead	Sept. 15	1.75
*N. Y. & Hudson Honor.	Sept. 19	10.00
*North Star	Sept. 15	1.00
*Oleary, Mich.	Sept. 16	1.00
*Ore. M. & M. Co. Ref.	Sept. 16	1.00
*San Carlos, Mex.	Sept. 20	.25
*Standard	Sept. 20	1.00
*Standard Cons. Ial.	Sept. 22	1.00
*Standard Oil	Sept. 15	1.00
*Tennessee	Sept. 15	.75
*Tennessee Copper	Sept. 21	.25
*Tennessee Utah	Sept. 21	1.00
*G. S. Steel com.	Sept. 1	2.41
*G. S. Steel pf.	Sept. 1	1.00
*Tish Copper	Sept. 10	.50
*Tish Copper pf.	Sept. 10	1.00
*Wolverine Mining	Oct. 1	.50

Monthly
1st Monthly
4th Monthly

Annually
Annually
Annually

**London (BY CABLE)**

Sept. 11

[illegible]

### Dividends of Foreign Gold, Silver, Lead and Copper Companies

[illegible]



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## Banking and Mining.

The idea to have banks make substantial loans on mining stocks of merit, as they do on railroad and other securities that are subject to market fluctuations, is worthy of careful consideration.

A system already exists by which certain banks in New York and elsewhere will accept as collateral for limited loans the stocks of mining companies with which men of known reputation in the financial world are connected in some way. In other words, these loans are often made to favor a particular person or corporation that offers the mining stock as collateral, and generally the banks charge interest that is high enough to protect them against a possible loss.

As a rule, however, the eastern banks do not care to encourage loans on mining stocks, perhaps for the reason that there has been altogether too much flim-flam by speculators who either do not give full particulars about their securities or are unable to do so because the mines represented on paper have a doubtful future.

It is known that private bankers will make loans on good mining securities, and, in fact, this custom is becoming more general, for the reason that quite a number of the smaller banking institutions have been founded on the wealth gained by their promoters in mining. Of course, these get-rich-quick bankers will often advise a depositor not to speculate in mining shares, and as often will they refuse to accept such stock as collateral for a needed loan.

Where a mine is producing and the reporting engineers agree that it will yield an equitable interest on the capital invested, bankers generally ought not to hesitate to take the shares as collateral for any reasonable loan. At the same time it should not be the policy of these bankers to charge an exorbitant rate of interest for "protection."

Often banks will act as registrars for mining companies; that is, only in such cases where they are absolutely sure of the standing of the men behind the enterprise. To be registrar for a supposed fraudulent mining company would discredit any bank no matter how influential it might be. Sometimes it will happen that a reputable bank has been forced to the wall as a result of wild speculation in mining shares by certain of its directors. We have read of several cases of this kind during the last two years, but they cannot be considered fair arguments against bank loans on mining shares of proved value.

In loaning any large sum of money on

mining stocks whether they pay good dividends or promise to in the early future, a bank should take every precaution to avoid loss by misrepresentation. Because the directors of the mining company are "captains of industry" who in any one of the multiple ways are connected with the Standard Oil corterie, the United States Steel Corporation, or any other of the widely advertised combinations of capital, should not suffice. Every share of mining stock offered as collateral to a bank should represent its part of the loan made—the signature of a prominent man or the euphonious title of the mine should not affect the better judgment of the engineers who have reported on the property. A legitimate mining enterprise can stand the closest investigation; a property whose operations are shrouded in mystery will need the X-ray to detect the fraud of its "selected" board of directors.

That judiciously managed mines of merit will, as a rule, yield good dividends on a reasonable capitalization, is evidenced by the statistics that are collected and published regularly in The Mining World. By dividends we mean the division of profits earned in working a mine, not the money that has been obtained by selling stock to investors. The practice of allowing stock buyers a "rebate" in the form of a "dividend" is one of several that has discredited mining shares generally and induced many bankers to refuse these securities as collateral for loans.

## Standard Oil Rebate Case.

The recently filed government petition for a rehearing in the Standard Oil "rebate" case in the Circuit Court of Appeals at Chicago makes a strong statement of reasons for such a rehearing. Considerable stress is laid upon the first point in the decision of the court setting aside the results of the trial before Judge Landis, that declaring erroneous the ruling of the judge which was said to exclude testimony showing lack of knowledge of the lawful rate on the part of the defendant and lack of intent to violate the law. It is stated that this is based upon a misconception of the record, as such testimony was not excluded, but was admitted and overcome by facts and circumstances, so that the evidence as a whole was "sufficient to show actual knowledge or what in law was its equivalent."

The petition for a rehearing further contends that an injustice has been done the trial judge, particularly in the assumption that he was trying to reach and

punish an innocent third party rather than the actual defendant. It is argued that the Standard Oil Co. of Indiana was an instrumentality of the Standard Oil Co. of New Jersey, and as such could fairly be visited with the extreme penalty regardless of the property and business standing in its own name.

A strong reason for a rehearing is given in that as the decision of the Circuit Court of Appeals stands, the rule of law to be applied in a new trial, both as to knowledge on the part of the shipper and the number of offenses, would be left in doubt, and if the decision is permitted to remain unmodified, it will "tend to encourage disobedience to law, to impede the enforcement of salutary statutes and largely to defeat their purpose."

### A New Coke Field.

Some people are under the impression that the Connellsville coke region in Pennsylvania is soon to witness keen competition. Recently there was a coke deal involving something like \$1,500,000 by which Julian Kennedy, E. H. Jennings and others forming a syndicate obtained 5,000 acres of coke land in Green county near the border of Washington county, Pa. Adding the land obtained previously, the Pittsburg people now own about 11,000 acres, which it is intended to develop immediately.

Another deal representing 3,000 acres of coking coal land valued at about \$840,000, in the same county, has been closed with J. H. Sanford and R. P. Burgan, trustees for a syndicate of prominent coal and furnace interests in Pittsburg.

If we add the deals mentioned above with the others that have been recently consummated the aggregate total is nearly \$5,000,000.

Economic transportation facilities will, it is believed, be assured by the Pennsylvania railroad which will build a spur line to the new coke field. That the Pittsburg syndicates are well financed is not doubted, but the question is, will they be able to win in certain markets now supplied by the interests that are affiliated with the United States Steel Corporation?

A sign of progress in zinc mining in the Missouri-Kansas district is the introduction of the steam shovel for underground work. On another page reference is made to the experiments of the American Zinc, Lead and Smelting Co. at its Prosperity mines, where, we learn, a specially designed steam shovel is at work in a drift 15 ft. high at a depth of

200 ft. All the machinery, weighing several tons, is on a revolving platform, which is moved from place to place by a wide wheel engine. The principal of operating the steam shovel is practically the same as the ordinary type of machine used on the surface. A factor which will limit the use of the steam shovel underground in the zinc-lead mines in the Missouri-Kansas district is the minimum height of roof under which work can be done, which is 14 ft. Of course, if the present type of machine is changed to adapt it to a lower drift, say of 7 to 9 ft., then we might expect a radical change in the mining industry in this section. It would be impossible, however, to use the steam shovel where pillars are close together. Any improvement in mining or the treatment of ore will be welcomed by operators who are obliged, especially at this time of low metal prices, to practice greater economy.

Increased activity in coal mining has resulted from the timely settlement of the labor troubles in the Birmingham district of Alabama recently. Had there not been a readjustment of these troubles the idleness of the miners would have seriously affected the year's output of coal in the state. Last year Alabama produced 14,250,454 short tons of coal, which was nearly double the quantity reported by Tennessee and nearly three times the output of Maryland. From 1840, when Alabama produced only 946 tons of coal, to the close of 1907—68 years—the grand total has been 164,734,310 tons. Not alone does Alabama consume appreciable quantities of coal for domestic purposes and locomotive fuel, it also manufactures coke for blast furnaces and other industries, and does a fair export trade in both coal and coke.

If present signs are correct in suggesting future events then the coal mining industry in the United States will end the year 1908 in a normal state. Of course, the output of coal for 1908 will be necessarily less than 1907, owing partly to the curtailment of dependent industrial enterprises which suffered from the panic last fall, and also to the fact that this is "presidential year." In the anthracite districts of Pennsylvania shipments for eight months this year amounted to 41,809,041 long tons, which compared with the corresponding period in 1907 show a decrease of 2,592,571 tons or about 6%. Much the larger part of the anthracite coal mined is consumed in the east, where the revival in business is somewhat slower than in the middle and far west. The smaller out-

put of anthracite coal this year will greatly affect the earnings of the eastern railroads, for it constitutes a large part of the freight of such roads as the Philadelphia & Reading, Lehigh Valley, Delaware, Lackawanna & Western, Delaware & Hudson, Pennsylvania, and the Central Railroad of New Jersey.

"No cigarette smoking" is the sign that the Nevada Consolidated Copper Co. hung up at its plant at Ely, Nev., some time ago. "No drinking of pulque in the mine" is the order posted recently in the Mexican property of the United States Smelting, Refining and Mining Co. To the American who has tried to quench his thirst with "pulque" there seems little doubt that the United States Smelting Co.'s order of prohibition will benefit the Mexican miner. Understand, pulque can still be imbibed by the Mexican miner at his home or social meeting place, but while at work in the mine he will be expected to forsake the national beverage.

The coinage of gold by the United States mints amounted to \$1,335,000 in August. Of this \$895,000 was in eagles, and \$440,000 in double eagles. Silver coinage was small during the month—\$94,000 in half dollars, \$610,000 in quarter dollars, and \$78,900 in dimes; a total of \$782,900. No minor coins were minted in August—a rather unusual occurrence. The total coinage for the month was \$2,117,900. There was also coined for the Philippines 1,919,944 silver peso pieces.

Although the gold output of India for August—41,533, fine oz. valued at \$88,483—was somewhat less than for July, it is nevertheless the second best monthly record in a year. During the eight months ending with August, this year the gold produced in this country amounted to 328,917 fine oz. valued at \$6,708,820. Compared with the corresponding period in 1907 there is shown an increase in 1908 of 3,946 oz. valued at \$81,654, equivalent to 1.2%.

In August the gold output of West Africa, amounting to about 23,768 fine oz. valued at \$491,302, was the largest for any month since last March. For the eight months this year the production totaled approximately 188,114 fine oz. valued at \$3,888,319, which compared with the corresponding period in 1907, shows an increase of about 2.5%. In other words, the gold mining industry of West Africa this year has established a new high record for production.

# Erection and Equipment of the Tintic Smelter.

By LEROY S. PALMER.

July 24, 1908, the sixty-first anniversary of the Mormon pioneers in Salt Lake valley, was celebrated at Tintic, Utah.

The Tintic smelter, or the Knight smelter as it is usually called for the camp's chief operator, was projected first as a private enterprise to treat the ores from the mines under the control of Jesse Knight. The plans were later enlarged to accommodate such Tintic mines as wished to avail themselves of the privilege and as shippers all over the intermountain country began to clamor for consideration it was decided to again enlarge the plans and seek custom wherever it might be found. Contracts have already been made with mines in Tintic, Bingham, Frisco, Pioche, Goldfield, Tonopah and some Idaho camps. A ship-

*This custom smelter is up to date in all details, and will treat the ore from mines in the intermountain region.*

*Cycle of operations with labor-saving machinery and apparatus. Electricity for power and light.*

of 12 by 30 in. rolls in the bucking room. A 75-hp. Allis-Chalmers, 3-phase, 60-cycle, induction motor, operating under 440 volts, drives all the machinery of the sampling mill. The sampled ore is loaded from the bins into 11-ft. push cars and if oxidized is trammed over a series of

tering furnace of the same capacity are to be added.

The sulphide ore is dumped into hoppers terminating in 12 by 12 in. charging doors in the roof of the furnace and rabbled through 9 by 15 in. doors, 54 in. apart in the side. The brick work is staid by two 6-in. l-beams, 12 in. apart at intervals of 48 in.

The dust chamber is U-shaped, to give sufficient length for settling dust. It is of brick, lined with fire brick, the base of concrete, the cross-section being a catenary curve, 12 ft 6 in. in diameter. Chambers, 16 by 20 ft., are provided at two points where it is necessary to change the level, that this may be done without edging and also to allow for settling dust. Side doors of steel are provided for the removal of the accumulated dust. The chamber terminates in the main stack.

The ore when roasted so as to contain not to exceed 4.6% sulphur, is raked into slag pots, allowed to sinter, and is removed over an inclined tramway to the ore beds.

Smelting is done entirely in blast furnaces. The lead furnace building is 34 by 160 ft., open at one side, frame work of steel with iron sheathing. It contains two 200-ton furnaces, and is to be equipped with two more.

The ore beds are provided with openings 9½ ft. long, closed with slats of 2 in. plank through which the ore is removed to hand huggies. These are weighed on a multiple beam scale, so arranged that the beams showing the weights are locked after being set and only the balance observed by the weigher, and dumped on the charging floor where the ore is charged by hand through iron doors which slide in guides.

The blast furnace is 48 by 160 in. at the tuyeres, the bosh widening to 84 by 184 in., giving a ratio of shaft to crucible of 2 to 1. The walls are 16 in. thick, of red brick, with fire brick lining supported on an elliptical brick base



View of Sampler, Roaster and Furnaces, Tintic Smelter.

ment from the Silver Shield mine in Bingham was in the bins long before the smelter was ready to treat it.

The plant is situated between Robinson and Silver City and is accessible by the Denver & Rio Grande and the San Pedro, Los Angeles & Salt Lake railroad, as well as by the Eureka Hill, a narrow gage road owned by the Knight interests.

The company has its own sampler and the Taylor & Brunton Ore Sampling Co. has announced its intention of building at once a 600-ton plant, convenient to the railroads, which will be the largest of its samplers.

The ore is brought to the sampler over a trestle with both standard and narrow gage tracks and is dumped into a bin from which a feed gate discharges it without separation of coarse and fine to a No. 4 D. Gates gyratory crusher, with corrugated pestle. The crushed ore is hoisted to the top of the mill by an elevator with 6 by 14 in. cups spaced 18 in. apart. A Vezin sampler takes out a tenth cut at the elevator dump, which goes to a set of 14 by 30 in. Allis-Chalmers C rolls, the excess running by gravity in the bin provided for the sampled ore.

The sample after passing the rolls is again cut down to one-tenth, which passes to a set of 12 by 24 in. rolls, is again cut to one-tenth and sent to a set

parallel tracks to the ore beds which are 120 by 280 ft., or if sulphide to the roaster building.

The roaster building, 70 by 90 ft., is to be increased in length to 168 ft. and is constructed of corrugated iron on a steel frame. It contains two hand reverberatory roasters, 178 by 606 in., having a capacity of 20 tons each. Four more reverberatories and a mechanical Kelly sin-



Exterior View of Lead Furnaces, Tintic Smelter.

staid by 3-in. square iron braces tied by 2½-in. bolts.

The upper brick work is bound by six horizontal 8-in. I-beams, held on each side by a vertical T-rail, bound by a ¾-in. turn buckle rod and the water jackets are bound by a ¾-in. wrought iron tie rod.

The water jackets are of steel, resting on the brick base, one at each end and four in 40 in. sections on each side. Each section has two 6-in. tuyeres, making eight tuyeres 20 in. apart on each side. These tuyeres have an all-metal connection to the 18 in. trestle pipe, which is served by the 30-in. main air line.

The slag is tapped from a 2 by 3 in. elliptical tap in the front of the furnace, and the lead from a 6 by 10 in. Arents siphon in the side. The shaft is carried up to the roof where it terminates in a straight stack for blowing in and blowing out, thus relieving the feed floor of all gases during these operations.

In operation, the fumes are discharged through a 60-in. down corner to a steel balloon flue 10 ft. in diameter and 13 ft. deep, provided at the bottom with 10 by 12 in. sliding doors, 5 ft. apart, for the removal of dust.

The flue terminates in a brick dust chamber, dividing into three parallel chambers, each of which is provided with a heavy sliding steel door by which it can be cut out. These chambers are of the same size and shape as that from the roasters, spaces being left for expansion.

The dust is removed from doors in the side and briquetted with a hinder of lime in a Chisholm, Boyd & White press. The stack to which all fumes pass is of steel with fire brick lining 10 by 150 ft. on a concrete chamber, 15 ft. square outside.

The lead is tapped through the Arents siphon into pots and poured into drossing kettles where the dross is skimmed off, the lead siphoned into molds, cast and loaded for shipment. The drosses are squeezed in a Howard alloy press to free them of lead and sent for retreatment to the copper furnace.

The slag is tapped into forehearths, from which the matte is tapped of and after cooling is crushed in a sulphide mill, returned to the reverberatory roasters and then to the copper furnaces. The slag overflows to slag cars which are hauled by a Westinghouse electric locomotive with cable reel to the dump.

At this writing the copper furnace is not in a sufficiently advanced stage of construction to admit of a detailed description. The building which is of steel, 34 by 50 ft., adjoins that of the lead furnace.

The copper furnace is of the blast type, 44 by 120 in., with a capacity of 150 tons, to be lengthened to 400 in. for a capacity of 500 tons. The fumes pass through a 60-in. down-come to a fire brick lined concrete chamber, then through a 96-in. elbow to the balloon flue. It is expected that most of the dust will thus settle in the chamber and large elbow before reaching that portion of the flue that carries the fumes from the lead furnace.

In the blower house, which is 32 by 60

ft., are a General Electric Co. centrifugal blower with a capacity of 5,200 cu. ft. and pressure of 52 oz. direct connected to a 75-hp. induction motor and a Connellsville cycloidal blower, having a capacity of 10,800 cu. ft., 65 cu. ft. per revolution, with a pressure of 30 to 42 oz., belted through a jack shaft to a 100-hp. Allis-Chalmers induction motor. Aside from the smelter proper and its equipment are a machine and carpenter shop, which will not only do the smelter work but all work, including timber framing for the Knight mines.

The company receives its power from the hydro-electric stations of the Utah Central Light & Power Co., and operates its own transformers. The current enters the camp at 5,000 volts, and is transformed to a 450-volt, 3-phase, 60-cycle alternating current.

Coke is supplied by the mines at Sunnyside, Utah, the hoppers being placed under a trestle adjacent to the ore beds and convenient to the charging floor.

The company operates its own lime

itself to turn out the finished product at an early date.

Only such enlargements have been mentioned in the foregoing account as are immediately contemplated and for which the equipment is already ordered. These, it will be seen, will give the plant a capacity of 800 tons of lead ore and 500 tons of copper ore daily, a plant comparing very favorably in size with the others throughout the country.

Conditions in Tintic are favorable to smelting. Water is scarce, some of the deepest mines being absolutely dry, and for this reason there is no agriculture to be injured by the sulphurous fumes. The two railroads reaching the camp have agreed to make the same freight rate on ore as to the valley smelters, and as shippers from Utah, Idaho and Nevada seem to look with favor on this independent enterprise Tintic bids fair to establish a reputation as a smelting center, as well as a prosperous mining camp.

The sampler was equipped by the Allis-Chalmers Co.; machine shop, by the Utah



Lead Furnace No. 1, Tintic Smelter.

quarry, and the Dragon Iron Mine in the district gives a plentiful supply of iron, although most of the Tintic mines have good fluxing ores, two of them being controlled for this purpose by companies operating large smelters at Bingham Junction.

The Swansea mine furnishes the water which is pumped to the collar of the shaft and runs at the rate of 300 gals. per minute by gravity to two steel tanks, each having a capacity of 25,000 gals., on the hillside above the smelter. This flow is ample for the present, but before the enlargements are completed a cooling tower will be erected for the recovery of a large part of the water.

At this writing it is too early to give a detailed account of the metallurgical practice, cost data, etc., but the plant is thoroughly up to date and in the hands of competent management. For the present lead will be shipped for refining and matte for converting and refining, but it is the intention of the company to equip

Mining & Machinery Co.; laboratory, by the Mine & Smelter Supply Co.; lead furnaces, supplied by the Denver Engineering Works Co.; copper furnaces, supplied by the Silver Bros. Iron Works Co. of Salt Lake.

Howard P. Saunders was the designer and construction engineer, and R. S. McCaffery is the metallurgical superintendent of the Tintic smelter.

*British Quicksilver Trade.*—The consumption of quicksilver in Great Britain this year is much better than it was in 1907. The net imports for eight months were 26,423 flasks of 75 lb. each, as against 17,408 flasks in 1907. Prices also have been somewhat better in 1908.

Iron ore imports into Great Britain for the eight months ending with August were 3,914,460 tons, as against 5,416,391 tons last year.



# The Moctezuma Copper Deposit in Mexico.

By CHAS. A. DINSMORE.

Imagine, if you can, a pear 2,000 ft. long, 100 ft. wide at the stem and 900 ft. wide at the base, with a skin from 10 to 300 ft. thick, and with two seeds in the core, one averaging over 75 by 175 ft., the other more than half so large. That is the Pilares mine of the Moctezuma Copper Co., at Nacozari, Sonora, Mexico—and all the skin and those two seeds are ore running 5 to 10% copper—and some of it runs higher. The company is now down some 50 ft. in this property, the drill has gone another 400 ft., and ore is everywhere. The company is handling the Guadalupe stone (the biggest seed) as well as the skin on the stope and pillar system, work out a stope 50 ft., then

*History and geology of the Pilares mine. The town of Nacozari and its buildings. Diamond drilling shows ore at great depth. Present output 2,500 tons of ore daily.*

*Cost of mining, and methods employed. Waste used to fill stopes. Electricity for power and light.*

But this ore body pinched out to a very doubtful proposition.

Now it is said (and nobody knows whether it's true) that the Guggenheims

Ariz., and by way of the Ferrocarril de Nacozari, a railway owned by the Phelps-Dodge interests, who also own the Moctezuma Copper Co., the Copper Queen mines at Bisbee, the Copper Queen smelter at Douglas, and other extensive properties throughout this section, as well as the famous coal fields of the Dawson Mining Co., at Dawson, N. M. This road takes one up and down through a winding valley, with towering peaks on every side, and fertile fields all refreshing after the hundreds of miles traveled over arid wastes to get here. The distance from Douglas is about 75 miles.

The town of Nacozari is owned by the mining company, and Manager James S. Douglas is really the monarch. He has



A Modern American Plant at Nacozari.

leave a 50-ft. pillar of solid ore, and so on. When the company takes down the pillars it will do so on the top slicing system.

Not so many years ago A. J. Alexander, a competent mining man and prospector, went "down into the heart of the Yaqui country" and after some time found and located what is now the Pilares mine. He did some work and ran in a tunnel about 75 ft., but the showing didn't justify the work, and he turned down the prospect and abandoned it. Later for a short time the Guggenheims got hold of it and they worked out considerable ore in the "caliche" to the north of the deposit.

have decided when they thought their Pilares mine was pinching out that they would give the Phelps-Dodge people a chance to get rid of a big white elephant. So Mr. Douglas, pere, was seen about it, and he and his sons, James and Walter, went down to take a look at it. They knew something about the country generally and a lot about copper. Advising the purchase, the Douglas's, of course, put it through, and the son James S. was put in charge. That he has developed one of the greatest copper mines on the continent speaks of the sagacity and mining knowledge of this family of experts.

One reaches Nacozari through Douglas,

studied this matter of town-making too, as is evident by the success of his initial effort. Here are two saloons, one for the Mexican laborers and the other for the higher classes of all races. The first saloon closes at 7 p. m., the latter at 9, and neither love nor money nor friendship can induce any particle of the liquids to be dispensed at either place till 5 o'clock the next morning. The company owns and conducts the hotel, first-class in every way; owns the store, one of the largest wholesale and retail establishments in the southwest; owns the water-works and electric light plant—in fact, everything but the people—and there are



those who say it owns a majority of these.

The country is rugged. An abundance of timber is found everywhere, and there is water in abundance and of good quality. The general formation is an andesite, with belts or dikes of rhyolite cutting through now and then, and sometimes a little lime. The ore (copper) occurs in the andesite. At times small fissures cross the country and carry usually high silver values, tetrahedrite predominating. Sometimes gold in good quantity is associated with the copper. Sometimes, too, the copper runs high, and at one small property lessees are taking out quantities of almost solid red oxide assaying extremely high.

The country is so stable that as one finds the conditions he well-nigh knows what he will get, thus making exploitation less hazardous than common. The small properties being worked pay handsomely, as well as the big ones.

A narrow-gauge railway takes one from the town to the Pilares mine, a distance of about four miles. The railway stops at the mouth of a 6,000-ft. tunnel, which ends at the Pilares shaft. In about one-third of the distance of the tunnel is the "Y" shaft. From the tunnel floor to the surface is about 500 ft. in the Pilares shaft, and at the surface is the town of Pilares, where are the works of the mine, and where the workers live. C. A. Smith is general mine foreman; Wm. Knight and W. B. Hicks, underground foremen; E. M. Rabb and George Putnam, civil engineers, and Wm. McKenzie, timekeeper.

There is quite a town here, the Mexican miners living in excellent brick houses built by the company. The office building is ample, and the big store supplies all the wants, from a check for their money to everything in clothing, food or drink.

The surface showing is in what is called by the Mexican miners "caliche," meaning a very soft andesite dike. This has a tendency to cave and surface water percolates through it to some extent; this is the only source of water in the mine. "Slickensides" are noticeable in many places. The "caliche" is the hanging wall in some places, but on the south and west of the ore body is a well defined andesite wall dipping slightly. The ore bodies on the inside of the pear—named the Guadalupe and the Don Juan stopes—are the same in character as those on the outer rim, but they are perfectly dry, and in fact, the dust in these stopes is sometimes very annoying. Between the inner and outer ore bodies the material is barren.

The ore is found around the entire pear or horseshoe, the narrowest point carrying 15 ft. of ore and the widest 300 ft. There are two of these ore bodies, one having an average width of 40 ft., and the other more than 100 ft. The lowest stope is on the 6 level, 500 ft. below the surface. The ground below has been prospecting with diamond drills, and the ore increases in value with depth. The drilling showed that there were good ore bodies for at least 300 ft. deeper than the present lowest workings. No native copper is found, but all the grades of sulphides occur, from chalcopryite up to glance, and occasionally some bornite.

The company is mining about 2,500 tons

a day, working 200 miners and 80 carmen, with 75 contractors on the faces. The work is done by contract, prices ranging from \$7 to \$11 per ft., according to the nature of the ground. Mr. Douglas states that there is no comparison between this method and day's labor, and 50% of the ordinary mucking and all tramming is done by contract. All miners work by contract, and get so much for every foot of holes drilled.

There are two methods of stoping in use. One style breaks the ore continuously for 100 to 200 ft. at a stretch, reaching the roof by standing on the broken ore and drawing off the surplus. When this has been done to the limit of the strength of the walls, the miners draw off all the ore and fill from the surface, and then repeat the process. The other method is to take short cuts, 10 to 15 ft. high, drawing out all the ore and filling to within a few feet of the roof, then

left in the mine to fill stopes. No water is hoisted; it all runs out through the waterway in the traction tunnel. Timber costs aggregate only a few cents (Mexican) per ton of ore mined, because the hardness of the ground makes timbering generally unnecessary.

The miners are all Mexicans, and do good work, the drillmen being among the best in the world. All drilling is single hand work. The workmen drive 5 to 8-ft. holes, breaking 5 to 15 tons of material to a hole.

It takes six hours, traveling four miles an hour and no stops, to go through the mine. One will in making the trip for investigating purposes take about twice as long and use up at least 12 candles. No portion of the mine is without tracks, and about 25% is equipped with electric lights.

The power is electricity transmitted from the Nacozari main power station



Plant of Moctezuma Copper Co.

making another cut and proceeding as before.

The country rock is andesite and the rhyolite comes in as a volcanic outflow. A large part of the rhyolite is brecciated. The ore is found both in the andesite and rhyolite breccia, but the andesite is the original source. It is expected that all ore found in the lower workings will be in andesite.

High grade ore is shipped direct to the Copper Queen smelter at Douglas. Recently the company opened up a new body of rich sulphides in the "Y" shaft. It is in this section that Mr. Douglas has decided on the 50-ft. stope and 50-ft. pillar system of mining, as well as in other portions of the skit of the pear.

The great advantage in this mine is that all ore is chuted from every level to the 700—the main traction level—and loaded direct on to the cars as they go to the mill. No ore is hoisted. Another economy is that no waste is hoisted; it is

At the Pilares plant, however, there is a reserve of many thousand cords of wood for use in case of necessity. There are two boilers here, and steam can be connected with the hoists in the event of a shutdown of the electric plant for any reason. A new air compressor has just been installed.

It is expected that work of sinking at the "Y" shaft will be resumed in another month and forwarded to the 10 level. Then it is proposed to drive a traction level on the 1,000 and do all hoisting between the 10 and 7 levels by means of an automatic skip. The skip station has been cut out and all preparations made for this new work, and the shaft is ready for sinking. The company is only waiting for the close of the rainy season. There is a winter 40 ft. below the 700 level in 8 to 14% ore.

A conservative estimate places the ore in sight as sufficient for five years' continuous work at 2,000 tons a day. Only

60% of the ground above the 7 level has been explored, leaving 10% to be developed. The figures are of the ore in reserve.

The company expects shortly to run a 1,000-ft. tunnel to crosscut and tap a prospect on the southwest side of the mine and outside the horseshoe. This is called the San Juan property. An 80-ft. shaft developed excellent ore. This shaft will be deepened and it and the crosscut tunnel will connect at considerable depth.

It costs about \$3 (Mexican) to mine and load a ton of ore on the cars. I asked Mr. Douglas his idea in stoping 50 ft. and leaving a 50-ft. pillar of ore, and he said: "We use the 50-ft. pillar because the 'caliche' runs across the pillars and we believe that less than 50 ft. would not hold the country long enough to get the ore out. Then we shall fill the stopes after the ore has been taken out, and we shall get the pillars by top slicing."

It is probable that the concentrator at Nacozari, where the ores of the Pilares mine not rich enough for shipping are milled, is one of the most efficient in the country. It handled at the time I was there 800 tons a day, working with only half the installation, and when both units are in operation the plant will easily treat 2,000 tons daily. The concentrator was built under H. Kenyon Burch, the chief engineer in charge of construction and mill superintendent. The foundations, buildings and settling tanks are of cement, and indeed wherever possible the construction is all of this material. Over \$175,000 (gold) worth of cement has been used in the completion of the milling and electric generating plant. Where in the old concentrator it requires 14 men, Mr. Burch triples the amount of ore crushed with two men. The machinery in the new plant was installed by the following firms:

Crushing plant—Power & Mining Machinery Co., Milwaukee, Wis.  
Revolving screens, 4 by 10 ft.—Allis-Chalmers Co.

Conveyors—Stephens-Adamson Co., Aurora, Ill.

Weighing machine—Western Engineering Co., New York City.  
Rolls—Chalmers & Williams, Chicago.

Jigs (designed by Mr. Burch)—Tracey Engineering Co., New York, and built by the Oil City Iron Works, Oil City, Pa.

Wilfley tables—Mine & Smelter Supply Co., El Paso branch.

Chilean mills—Power & Mining Machinery Co.

Vanners (Johnston concentrating machines)—Risdon Iron Works, San Francisco, Cal.

Callow screens—General Engineering Co., Salt Lake City.

Pumps—Allentown Rolling Mills, Allentown, Pa.

Motors—General Electric Co., Schenectady, N. Y., and Allis-Chalmers Co.  
Automatic feeders—Traylor Engineering Co., New York City.

Trommel system—Stephens-Adamson Co.  
Centrifugal pumps—Morris Machine Works.

Steel building—Minneapolis Steel & Machinery Co.

Cement—Iola Cement Co., Iola, Kans.  
Transmitting machinery—Jones & Laughlin, Pittsburgh, Pa.  
Paint—Goheen Carbonizing Coating Co., Canton, Ohio.

When I visited the plant recently only half was in operation, and machinists, carpenters, etc., were busy in one end of the building installing the second unit, while in the first unit they were "combing out the mazuma" at the ratio of one ton to five. The flow-sheet of the mill tells a story like this:

The ore is dumped from the cars into a bin of 6,000 tons capacity, above the crushing plant. The run of mine ore is fed from the bin by two automatic ore feeders of special design, these distributing the ore onto grizzlies, the bars being set 2½ in. apart. Oversize to No. 8 gyratory crusher; undersize to belt conveyor, meeting throughs from No. 8 gyratory; fines from grizzlies, and throughs from gyratory by conveyor to two 4 ft. by

of three sets of 42 by 16 rolls; to elevator; to mixing box at head of trommels. Tails from fine jigs to dewatering machines; overflow from dewatering machines to vanner settling tanks; dewatered material to jig tailings bin; to Chilean mills through 2½-mm. screen; to Callow screens (22-mesh). Oversize to feed distributing device, which divides the feed into equal parts for each machine, so it is impossible for an attendant to lessen or increase the feed to a machine. This is the invention of Mr. Burch. Oversize from screens to Wilfley tables; undersize to vanner settling tanks. Middlings from Wilfleys to Chilean mill elevators, and returned to the mills. From settling tanks to vanners. Concentrators from jigs, Wilfley tables and vanners to concentrate bins by gravity.

Water is obtained from a well sunk by the side of the river, and is supplied by two pumps each of capacity of 500 gal a minute, discharging into tanks above



Hoist and Ore Bins at Pilares Mine, Moctezuma Copper Co.

10 ft. 1½ in. perforated manganese steel trommels.

Undersize from trommels to belt conveyors; oversize from each trommel to two No. 5 shorthead gyratory crushers, crushing to 1-in. cubes; throughs of trommels meeting throughs of crushers on belt conveyors to storage bins, which have a capacity of 4,000 tons.

From storage ore bins through portable ore feeder to belt conveyor, over automatic weighing machine and automatic sampler and into the mixing box to 18-mm. trommel. Oversize to bull jigs; undersize to 11-mm. trommels. Oversize to coarse jig; undersize to 7-mm. trommel. Oversize to intermediate jigs; undersize to 4-mm. trommel. Oversize to fine jigs; undersize to 2-mm. trommel. Oversize to fine jigs; undersize from 2-mm. trommel to callow screens (22-mesh). Oversize to Wilfleys; undersize to Wilfleys.

Slimes from Wilfleys to vanner settling tanks; middlings from Wilfleys to Chilean mill elevators. Tails from bull jigs, coarse jigs and intermediate jigs to either

the mill which has a capacity of 500,000 gal.

The machinery in this plant consists of the following:

2 Ore feeders at bin at crusher plant  
2 Grizzlies, 2½-in. space between bars.

1 No. 8 gyratory crusher.

1 Belt conveyor, 36 in. wide, 46 ft. long, running 400 ft. per minute.

2 1 by 10 ft. manganese covered steel trommels, 1½-in. perforations.

4 No. 5 shorthead gyratory crushers.

1 24-in. belt conveyor, 332 ft. long, running 300 ft. per minute.

1 24-in. belt conveyor, 90 ft. centers, 300 ft. per minute.

1 18-in. belt conveyor, 245 ft. centers, 250 ft. per minute.

1 18-in. belt conveyor, 152 ft. centers, 250 ft. per minute.

2 18-in. belt conveyors, 89 ft. centers, 250 ft. per minute.

4 Trommels, 42 in. in diameter, 6 ft. long, 18 mm.

4 Trommels, 42 in. in diameter, 6 ft. long, 11 mm.

- 4 Trommels, 42 in. in diameter, 7 ft. long, 7 mm.  
 6 Trommels, 42 in. in diameter, 8 ft. long, 4 mm.  
 6 Trommels, 42 in. in diameter, 8 ft. long, 2 mm.  
 56 Wilfey tables.  
 8 Single compartment bull jigs.  
 8 Single 2-compartment coarse jigs.  
 8 Single 2-compartment intermediate jigs.  
 24 Three-compartment fine jigs.  
 16 Duplex Callow screens.  
 10 Dewatering tables.  
 10 Chilean mills.  
 8 Elevators, in pairs.  
 12 Feed distributors for Wilfleys.  
 72 Vanners.  
 6 Sets 42 by 16 rolls.  
 6 Dewatering feeders for rolls.  
 2 Portable ore feeders from storage bins.  
 8 Feeders for Chilean mills.  
 5 12 by 14 triple pumps.  
 2 4-in. centrifugal pumps.  
 3 3-in. centrifugal pumps.  
 2 10 by 12 triple plunger pumps.  
 3 75-hp. induction motors.  
 4 150-hp. induction motors.  
 4 5-hp. induction motors.  
 3 75-hp. induction motors.  
 2 40-hp. induction motors.  
 2 30-hp. induction motors.  
 6 20-hp. induction motors.  
 4 20-hp. induction motors.  
 48 12 by 12 reinforced concrete settling tanks for reclaiming water from tailings.  
 20 Elliptical-shaped reinforced concrete concentrate bins, 10 by 14 by 18 ft. high.  
 40 12 by 12 reinforced concrete settling tanks, used as pulp thickeners for vanner feed.

The plant is notable for its efficiency, equipment, and neatness of design. The new features include:

All floors, including on and above ground, are of concrete. There is not a wooden floor in the building.

Elevator housings are of reinforced concrete.

Vanner baths are of reinforced concrete.

Feed distributing machinery for Wilfley tables.

Dewatering tables for jig tailings.

Dewatering feeders for rolls.

Jigs, all of special design and cast iron throughout.

Portable ore feeders under storage bins.

Each feeder will accommodate nine different chutes.

Man elevator from the Chilean mill floor to top of plant.

All concentrates and tailings are carried from mill through tunnels and trenches underneath mill floors.

The mill is always light as day. There are innumerable windows for day-time, and myriads of electric bulbs at night give the great structure a brilliant appearance.

Electricity is generated in a great central power house just back of the town of Nacozari. The boiler room is of corrugated iron, the turbine room of reinforced concrete, and the smokestack, 15 ft. in diameter and 184 ft. high, is of reinforced concrete. Coal or wood is used as occasion requires, but the former mostly.

There are three 1,000-kw. Curtis turbine generators, direct connected, generating at

6,600 volts. There are Alburger surface condensers and dry condenser pumps. The circulating pump for the condenser is a Cornserville. The main exciter set is a motor generator set. An auxiliary steam turbine generator set of 50 kw. is used in starting. Four Stirling boilers of 435 hp. each are equipped with Foster superheaters and Green fuel economizers. There are three feed pumps, one steam pump and two variable speed induction motor-drive feed pumps. There are two Worthington duplex pumps using the oil system.

## Metal Production of North Carolina.

BY H. D. McCASKEY

The following table shows the production of gold, silver, and copper in North Carolina, by counties, in 1907. The figures have been obtained by the United States Geological Survey directly from the mines.

Compared with the production of 1906 the figures for 1907 show a slight increase in gold of 2,999 fine ozs., valued at \$62; a decrease in silver of 9,102 fine ozs.,

PRODUCTION OF GOLD, SILVER AND COPPER IN NORTH CAROLINA IN 1907.

County.	—Gold—		—Silver—		—Copper—	
	Ounces.	Value.	Ounces.	Value.	Pounds.	Value.
Burke	145.96	\$ 2,924	20	13	.....	\$ 2,989
Catawba	73.28	1,521	3	1	.....	1,352
Catawba and Gaston	318.97	6,574	68	45	.....	6,619
Davidson and Stanly	21.09	426	160	108	114,044	\$ 2,909
Franklin	57.37	1,186	5	2	.....	1,188
Guilford	90.13	1,862	.....	.....	.....	1,862
Granville and Perdue	2,556.69	52,498	6,746	4,425	286,021	57,304
McDowell and Rutherford	21.53	446	.....	.....	.....	7,744
Mecklenburg	374.61	7,741	.....	.....	.....	4,417
Montgomery	2,556.69	52,498	621	410	.....	52,498
Moore	10.88	225	.....	.....	.....	226
Randolph and Rowan	192.67	3,983	14,994	9,243	282,017	56,193
Union and others	121.52	2,514	33	21	.....	2,523
	3,976.08	\$82,193	21,666	\$14,300	582,082	\$116,414
						\$212,909

includes copper of Guilford County.

The switchboard is equipped with General Electric instruments. There is a 4-point relay Terrell regulator, which maintains a constant voltage on the generator. A total curve-drawing wattmeter records the total load at the station.

There are seven panels on the switchboard, as follows: One to the new mill; one to the Pilares mine; one to the pump supplying the city with water; one to the shops on opposite side of the river; one to the ice plant and for the city lights; one a station feeder, and one spare. These are all equipped with oil switches, remote control and wattmeters for each circuit. There is a frequency meter and a synchronizing instrument.

Power is transmitted about six miles to the mine. At the mine there is operated by electricity four locomotives, one 200-hp. air compressor and the hoists. At the "Y" shaft there is a 6-phase rotary converter, which takes the alternating current from the main power house and transforms it to a direct current to be used locally. W. E. Mashburn is the superintendent of the power house.

## Cement for the Isthmian Canal.

A contract for furnishing the Isthmian Canal Commission with 80,000 bbls. of cement, in addition to the 4,500,000 bbls. already contracted for, has been awarded to the Atlas Portland Cement Co. of Northampton, Pa.

It had been hoped that the work on the locks at Gatun, Miraflores and at Pedro Miguel would be begun about Jan. 1, as the original invitations for furnishing the Commission with cement contemplated that the deliveries in large quantities should begin then, but as the work of excavation for the foundations of those locks has progressed, it has been found desirable to make them deeper than was at first thought necessary, in consequence of which actual construction work will be delayed until July next.

valued at \$6,315, and a decrease in copper of 121,693 lbs., valued at \$19,413. The total value of the production of gold, silver, and copper in 1906 was \$238,575; in 1907, \$212,909; a decrease of \$25,666.

The chief decrease in the production of the state for 1907 resulted from the greatly curtailed output of copper ores at the close of the year, which was due to unfavorable industrial conditions and an unsatisfactory metal market. Notwithstanding the financial depression, however, 1907 may be considered a successful year in gold mining in North Carolina, and the state maintained her rank as first in quantity of gold production among the Eastern states.

## Antimony in the United States.

Although a falling market throughout the year gave little encouragement to the development of American production of antimony, the output in the United States in 1907 showed an increase of 256 tons in quantity and of \$19,497 in value as compared with the preceding year, the total being 2,922 short tons, valued at \$622,046, in 1907, as against 1,766 tons, \$602,549, in 1906.

As usual, reports the United States Geological Survey, the greater part of the antimony produced in the United States was that contained in antimonial lead and sold by the smelters in that form. As this alloy is extensively used in type metal, babbitt metal, coffin trimmings, and similar wares, the two metals need not be separated.

The imports of antimony in 1907, in the form of metal, regulus, ore and salts, exceeded even those of 1906, up to that time the greatest recorded, rising in value from \$1,616,381 in the earlier to \$1,686,802 in the latter year.

The consumption of antimony and antimony salts in 1907, as shown by the addition of the values of production and of imports, amounted to \$2,308,848.

# The Construction of Pipe Lines for Gas and Oil.

By **ULRICH PETERS,**  
Mechanical Engineer.

The history of pipe lines goes as far back as 1815, when William Murdoch, the discoverer of lighting with illuminating gas, installed in the Soho works near Birmingham, England, the first piping system for conveying gas throughout the shops. This pipe-line consisted of old musket barrels bought at the close of the long European wars. As the oldest pipe lines were made up of gun barrels, it has been occasionally reported during recent wars, that the gun barrels were constructed of cut up gas pipes.

Today pipe lines are the veins of all



Fig. 1

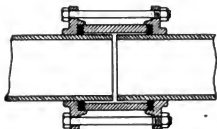


Fig. 2

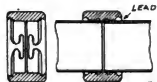


Fig. 3

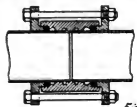


Fig. 4

Pipe Lines for Natural Gas.

industries, not only do they carry gas, oil, water and steam to supply the individual shops and homes, but they have led to the discovery of abundant quantities of natural gas and oil. The fields containing these valuable riches have been tapped, and the country, embracing several states, has been ensnared with a system of pipe lines which are hundreds of miles long. Through these pipe lines gas and oil is flowing to the thousands of consumers in the United States and abroad.

The gas and oil fields in western Pennsylvania, West Virginia, Indiana, Ohio, California and several other states have an abundant, but not inexhaustible supply for it depends how soon the existing wells will become dry and how many

*History of the pipe-line, and early work in the gas and oil fields of the United States. Consumption of natural gas, and its effect on coal mining.*

*Laying pipe lines, and advantages of pipes of different materials. Costs.*

new producing wells will be drilled and shot.

Shooting a new well is the last operation that the driller will try when the hole at the proper depth should not strike gas or oil. The dynamite exploding at the bottom of the well opens in the depth possible reservoirs surrounding the hole.

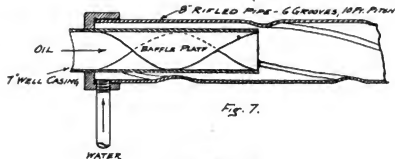


Fig. 7.

An 8-in. Oil Pipe Line.

In 1824, at Fredonia, N. Y., the first natural gas was piped to illuminate the village inn in honor of the visit of General de Lafayette. Later, in 1841, William Thompson struck a large flow of gas above the burning spring in the Great Kanawha valley and made use of same



Braces for Deep Ditches.

for heating salt furnaces. But it was not until 1857 when professional oil well drilling really began. Almost invariably the escaping gas was used to some extent for firing the boilers of the drilling engines.

The first natural gas plant was built in 1872; this consisted of a 5½ mile pipeline of only 2 in. diameter, laid from the Newton well to Titusville, Pa., for the purpose of furnishing gas for domestic use. The great advantages of gas and oil as manufacturing fuel was realized two years later, when Messrs. Rodgers and Burchfield began to use them in the puddling and heating furnaces and under

steam boilers. The glass industry also discovered that its product was of a better quality when natural gas instead of coal fire was employed.

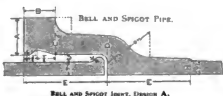
Today the yearly consumption of gas in Pennsylvania may be estimated at 175,000,000,000 cu. ft., which represents a value of about \$30,000,000. Figuring that 25,000 cu. ft. of natural gas equal the heating value of one ton of coal, this would replace annually 5,000,000 tons of coal valued at \$10,000,000. Of course, we could not say that burning coal is three times cheaper than natural gas. We could say though that gas is three times greater in value than coal for domestic uses, while to large consumers a considerably reduced rate is allowed without exceptions.

## PIPE LINES FOR NATURAL GAS.

The handling of natural gas in long

pipe lines presents far less difficulties than does crude oil. The pipes used for conducting natural gas vary in size from 2 in. to 3 ft. in diameter. Pipes 19 in. and less in diameter are usually made of screw joint pipe as shown in Fig. 1. More popular is the plain end pipe with couplings and rubber packing (Fig. 2), it is as cheap as the screwed pipe and is more readily laid.

Pipe sizes from 19 in. to 2 ft. in diameter are frequently laid with converse joints (Fig. 3). As with all lead joints, the disadvantage of this joint is that the packing material becomes loosened by the settling of the pipe and by the slight movement due to change in temperature.



BELL AND SPIGOT JOINT, DESIGN A.



Cast Iron Pipe Joints.

With the additional elastic rubber packing (Fig. 4) pressed against the outside of the joints by suitable glands, this joint has proved to be very satisfactory for pressures of 300 lb. per sq. in. and upwards.

Pipe lines over 24 in. in diameter are occasionally made of cast iron (see accompanying table), or riveted steel pipe. Lap welded pipes are made up to 30 in. diameter

be separated again at considerable expense by heating to about 180 degs. F.

The lighter oils from other fields cause less trouble, and several pipe lines have been constructed from the eastern fields to various shipping ports on the Atlantic coast, also across Panama and at other points.

Recently, after some experiments with the heavy California oils, an 8-in. rifled pipe line, a little over 31 miles long, and

the tropics, as in Panama, the lines are all surface lines barely covered with earth. The threaded pipes are screwed together with powerful lay-tongs, which leave the least dents in the pipes. The pipes are painted with tar or linseed oil and white lead, following close on the heels of the construction gang.

The laying of the heavier gas pipe lines requires special light derricks. Certain strata of the earth give much trouble by

TABLE OF DIMENSIONS OF CAST IRON PIPE.  
(Thickness of shell herein is proportioned to 200 lb. head or 86 lb. pressure.)  
(By R. D. Wood & Co.)

Inside Diameter of Pipe	Dimensions in Inches										Turned and Bored Joint
	A	B	C	D	E	H	L	T	R	S	V
3	1 1/4	1 1/4	1 1/16	3/8	3/8	3/8	2 1/16	.40	1 1/4	1 9/16	1/8
4	1 3/4	1 3/4	1 1/16	3/8	3/8	3/8	2 5/16	.42	1 1/4	1 9/16	1/8
5	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.45	1 1/4	1 3/4	1/8
6	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.47	1 1/4	1 3/4	1/8
7	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.49	1 1/4	1 3/4	1/8
8	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.51	1 1/4	1 3/4	1/8
9	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.54	1 1/4	1 3/4	1/8
10	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.56	1 1/4	1 3/4	1/8
12	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.60	1 1/4	1 3/4	1/8
14	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.63	1 1/4	1 3/4	1/8
15	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.67	1 1/4	1 3/4	1/8
16	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.69	1 1/4	1 3/4	1/8
18	1 3/4	1 3/4	1 3/16	3/8	3/8	3/8		.74	1 1/4	1 3/4	1/8
20	2	2	1 3/8	3/8	3/8	3/8		.78	1 1/4	1 3/4	1/8
24	2 1/2	2 1/2	1 3/8	3/8	3/8	3/8		.87	2	1 3/4	1/8
30	2 3/4	2 3/4	1 3/8	3/8	3/8	3/8		1.01			
36	2 3/4	2 3/4	1 3/8	3/8	3/8	3/8		1.14			
40	2 3/4	2 3/4	1 3/8	3/8	3/8	3/8		1.23			
42	2 3/4	2 3/4	1 3/8	3/8	3/8	3/8		1.28			
48	3	3	1 3/8	3/8	3/8	3/8		1.41			
60	4	4	2	3/4	3/4	3/4		1.63			
72	4 1/2	4 1/2	2 1/8	3/4	3/4	3/4		1.95			

All pipe 3 in. to 72 in. cast in lengths to lay 12 ft.

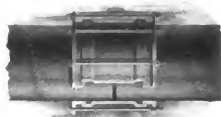
The illustrations given herewith of the reduced sections of a 12-in. diameter pipe show the form and general dimensions of "bell and spigot" and "turned and bored" pipe joints. Design A represents the most approved American practice.

#### PIPE LINES FOR OIL.

More trouble is experienced in conducting crude oil through long pipe lines, par-

one of 256 miles with 23 pumping stations, have been constructed by the Southern Pacific Railway Co. The rifling of the pipe is one turn in 10 ft. with plain, round ends to receive the threaded coupling. This rifling causes the viscous oil to whirl inside a thin film of water which is pumped with the oil, forming an effective water lubrication between the oil and the pipe.

The capacity of the 8-in. 31-mile line



Forged Steel Bolted Joint.

cause-ins and consequent accidents. Deep ditches, therefore, should, as a rule, be braced by "braces" pressing against checkboards at the sides.

The usual width of a ditch for 8 in. and smaller pipes is about 18 in. and is wider for larger pipes. The line should not be laid perfectly straight, a zig-zag wave of about 400 ft. and shorter in a vertical as well horizontal direction, amounting to the diameter of the pipe, will take care of all expansions and possible settling.

Every pipe rests on several stone foundations, and after painting is carefully embedded. Traps for collecting water are located at intervals and at the deepest points. After completion, sections of the line are subjected to a static test pressure, running about 200 to 500 lb. above the normal working pressure, and all showing leaks are repaired. The dirt from newly laid gas lines is blown out by the gas accompanied by a terrific roar.

#### COST OF PIPE LINES.

It is almost impossible to give an exact estimate of the cost of pipe lines without knowing the prevailing circumstances, which depend on the price of the pipe,



Tongs for Threading Pipe.

ticularly the heavy, thick and viscous fluid from the California fields, which has a density of about 14 degs. Baumé, or 0.912, the weight of water. On this account the transportation of this oil is mostly by rail, in specially constructed tank cars, for its movement in long pipe lines would necessitate a very high pumping pressure, or the installation of several pumping stations along the route.

Attempts to heat the oil before sending it through the pipe line have met with marked success for short distances, but in long lines, the oil disintegrated and deposited asphaltum, thus clogging the pipe. The introduction of about 30% of water has materially improved results of handling California oil, but the surging of the mixture through the line causes an emulsion of oil and water, which has to

and one pumping station, running at an initial pressure of 800 lb. per sq. in., is 675 bbl. per hour, while the capacity of the longer line with 23 pumping stations is about 1,000 bbl. per hour. The lubricating water is injected through the annular space of a 7-in. well casing, introduced inside the 8-in. pipe illustrated herewith. The amount of lubricating water is about 10% of the oil which is started through the well casing containing a twisted plate.

Oil pipe lines seldom exceed 12 in. in diameter, and are without exceptions laid with screwed and recessed couplings (Fig. 1.)

#### LAYING OF LONG PIPE LINES.

Pipe lines for gas and oil are usually laid in a ditch about 2 ft. deep and more, which is below the average frost line. In



Forged Steel Flange.

cost of laying, and of future repairs, and depreciation.

As a rule, wrought iron pipe seems to resist corrosion better than Bessemer steel pipe, and a good tar or paint coat-

ing will greatly add to the life of the pipe. In other respects, cast iron pipe lasts much longer, but is not well adapted to high pressures.

In many places salts and electrolytic action quickly destroy the pipe, but at other places the line remains perfect for many years.

The cost of lap-welded pipe runs at the lowest average at about 3 cents per lb. including the joint. The cost of hauling, laying and painting per foot are given in the following table:

Size of pipe.	Inch. dia.	Haul- ing.	Lay- ing.	Paint- ing.	Total
2	\$0.24	\$0.01	\$0.02	\$0.01	\$0.29
4	0.41	0.02	0.03	0.01	0.47
6	0.65	0.02	0.04	0.02	0.73
8	1.05	0.02	0.04	0.02	1.13
10	1.20	0.03	0.05	0.03	1.41
12	1.70	0.04	0.05	0.03	1.82
16	2.80	0.05	0.05	0.04	2.95
18	4.00	0.06	0.07	0.04	4.17
24	5.10	0.08	0.08	0.05	5.31
30	7.50	0.09	0.09	0.06	7.74

These prices are sometimes far from the actual cost, particularly in localities that have no shipping facilities.

### Bromine in United States.

The bromine industry in the United States is centered in Michigan, Ohio, Pennsylvania and West Virginia, named according to their relative importance, and the production from these four states is given by the United States Geological Survey as follows: 1907, 1,379,496 lbs., valued at \$195,281; 1906, 1,283,250 lbs., \$165,294; 1905, 1,192,758 lbs., \$178,914; 1904, 897,100 lbs., \$269,130; 1903, 598,500 lbs., \$167,580; 1902, 513,893 lbs., \$128,472; 1901, 552,043 lbs., \$154,572; 1900, 521,444 lbs., \$140,790.

In 1907 the four states named above produced 1,379,496 lbs. of bromine, valued at \$195,281, the average price per pound being a little more than 14 cents. The conditions in the trade were therefore somewhat better than in 1906; for in that year, though there was an increased production of 90,492 lbs., there was a decrease in value of \$13,710, and prices fell to an average of 12.8 cents per lb. The value per pound in 1907 is still below that for 1905, namely 15 cents. Prices were extremely low in 1907, and in some cases barely equal to the cost of production. The low prices are in large part, if not wholly, due to the heavy importation of German bromides.

Bromine was made as a byproduct in 1907 at Pomeroy, Meigs county, Ohio, and at Hartford, Mason county, W. Va., towns about five miles apart on the Ohio river, along one of its sharp bends.

A small deposit of manganese occurs about two miles east of Golconda, Nev. It is bedded and varies in thickness from a few inches to 3 ft., and is interstratified with calcareous and siliceous tufa. There is good evidence that this is a hot springs deposit in a small basin in the tufa, as supposed vents of the spring are seen on the slopes of the hills above it. The ore is mainly wash in black powder, or small fragments, slightly consolidated.

### The Gypsum Industry in United States.

BY ERNEST F. BURCHARD.\*

Gypsum occurs in sedimentary rocks of practically all ages, either in the crystalline form or as rock gypsum, and it is widely distributed geographically. It is found in places in the vicinity of beds of rock salt. In the United States workable deposits are confined to beds of rock gypsum, which occur at comparatively few geological horizons. The beds of rock gypsum east of Missouri river are, for the most part, in Paleozoic rocks, while those of the west are mostly of Mesozoic and Tertiary age. The white gypsum sands of Arizona and New Mexico consist of fine-grained material that has been eroded from rock outcrops and worked in Quaternary time by the winds into its present condition and position.

Gypsum deposits consist of masses of gypsum grains mixed with more or less clayey matter and sand. Some of these deposits lie in basin-like depressions, but others have been found on rounded hills at the horizon of beds of rock gypsum.

About five miles northeast of Watonga, Blaine county, Okla., deposits of gypsum occur as a silt in a shallow valley cut between gypsum crested hills. The gypsum lies at a lower level than the two beds of gypsum which occur in the hills, and from the character and relations of the materials the gypsum ledges have apparently contributed the disintegrated material which has been washed down and spread out in the valley below.

Rock gypsum is produced in 16 states and in one territory, besides Alaska. In most of the producing localities the material is mined from underground workings, but in Oklahoma it is still quarried, since outcropping ledges still afford available rock. Gypsum deposits, owing to their nature, are worked in the open, and where this material is of good quality it is regarded as particularly valuable on account of the low cost of excavation.

The bulk of the gypsum produced in the United States as well as in foreign countries is manufactured by grinding and partial or complete calcination into the various plasters, such as plaster of Paris, stucco, cement plaster, flooring plaster, hard-finish plaster, etc. A steadily increasing quantity is being used as a retarder in Portland cement.

Refined grades of plaster are used in dental work, also as cement for plate glass during grinding, and as an ingredient in various patent cements. Considerable quantities are ground without burning and used as land plaster or fertilizer, while smaller quantities are used in the manufacture of paint and paper, imitation meerschaum and ivory, and as an adulterant. The pure white massive form, known as alabaster, is much used by sculptors for interior ornamentation.

For plaster of Paris and for dental, molding, and casting plasters a high-grade rock gypsum, ground very fine, is required, and the product is not mixed with any foreign substance or retarder, but is

used in the pure or "neat" condition. Such plasters are quick setting and usually white in color. Much of the so-called cement plaster is made directly from gypsum, an impure unconsolidated earthy or sandy form of gypsum, which in many places is found to contain a suitable percentage of foreign material, so that the addition of a retarder is not necessary to effect a slow set.

Where gypsum deposits are not available, cement plasters are made from rock gypsum by the addition of various mineral or organic retarders. A large part of the structural plaster now produced is used in specially prepared conditions that appeal to the builder on account of their convenience. A plaster board is pressed from plaster interlaminated with sheets of thin cardboard. This plaster board is furnished in thin sheets, 32 by 36 in., comprising 8 sq. ft. of surface, and is designed to be nailed directly to the stud- ding in place of lath, and to receive a coat of wall plaster directly on its outer surface. Fibered plaster is molded into both solid and hollow blocks and tiles, which are used in partitions and interior construction, and these, as well as the plaster board, have been proved to be of value as fire retarders.

Wall plasters are of two general grades—one a brown or gray coat, and the other a white or tinted finish coat. The wall plasters are commonly made with wood fiber or hair filler, and a wood-pulp plaster is also being made that is finding use on the outside as well as on the inside of houses.

Gypsum is used in the manufacture of calcimines, in water paints and tints, and to a considerable extent as an ingredient in dry colors, notably in Venetian reds. When used in excess in mineral paints it is regarded as an adulterant. The unburned, or the dead-burned, forms of gypsum may be used to a certain extent with oil paints, because they are chemically inactive. The partially dehydrated form is not suitable for such use, but can be used with water.

The gypsum mined in the United States in 1907 amounted to 1,751,748 short tons. The greater part of this output was converted during the year into the various products already mentioned, and the total value of these gypsum products, plus the value of the gypsum sold crude, was \$4,942,264. The production for 1906 far exceeded that of any previous year, but in 1907 the gypsum mined increased in quantity 211,163 tons, or 13.7%, and the total value increased \$1,044,289, or about 28.8%, as compared with the corresponding figures for 1906.

Imports for consumption in the United States in 1907 were valued at \$535,658, against \$508,729 in 1906. The 1907 imports were distributed as follows: Ground or calcined, 1,979 short tons, valued at \$12,825; unground, 453,911 tons, \$486,265 and manufactured (plaster of Paris), \$36,528.

There are instances where 80 men ride in a shaft at one time, and at a speed of 40 miles an hour. This means a speed of 3,200 ft. per minute, or 50 ft. per second.

\*Extract from Mineral Resources of U. S. for 1907.



## The Steam Shovel in Zinc Mining.

BY OTTO RUHL.

The first steam shovel ever used in zinc mining has been introduced into the Missouri-Kansas district by the American Zinc, Lead and Smelting Co. in its mines at Prosperity. This shovel is being utilized in the No. 2 shaft at a depth of 290 ft. from the surface, in a drift 15 ft. high. The shovel has now been in use about two months and has been tried out very carefully.

The machine was designed by Capt. R. Thew of Loraine, Ohio, who spent some time in the mines of the American Zinc, Lead and Smelting Co. studying the conditions to be met in the construction of the steam shovel. The machine is much like the ordinary steam shovel, the crane being 18 ft. long and constructed of steel.

At the extreme end of the crane the steel cable attached to the shovel for lifting, runs over a pully down the length of the crane to a revolving drum actuated by an engine which is under the control of the operator.

As a part of the crane there is a second arm which works upon a slide bearing and hinges in it at one end. Upon the other end of the arm is fastened the shovel proper. This arm is actuated by a chain belt which will shove it outward into the ore, or pull it backward.

The crane is attached to the platform of the machine at its base, and is supported from its outer end by heavy truss rods.

Upon the platform there are three engines, one of which drives the drum which elevates the shovel at the end of the crane, a second which pushes the arm that holds the shovel, while the third engine revolves the platform so that the shovel may be worked in any direction. Each engine is run by compressed air.

All the machinery is shut in by thick heavy steel plates which act as an armor, thus protecting the delicate working parts from flying rocks when any blasting is done.

The levers for the control of the three engines are at one side of the machine so that one operator may have full control of the shovel.

All the machinery is rigidly fixed upon a revolving platform, which is built very strong and heavy, and is supported by heavy trucks to hold the immense load, amounting to several tons. The machine can be moved from drift to drift by its own traction, one engine being used for this purpose. It is not moved on tracks, but heavy boards, which are placed under the wide tired wheels to furnish a smooth surface.

The machine is built entirely of steel, and will wear a long time. The dipper of the shovel has a locking bottom, and the operator dumps by pulling a rope. When the shovel is again lowered the bottom is self-adjusting. A set of strong steel teeth are attached to the mouth of the dipper to aid in gathering up boulders. These can be easily replaced at slight expense and prevent the dipper from hard wear.

The machine has not been in operation long enough to fully test its capacity,

though it has handled from 200 to 300 cns of material, holding 1,200 to 1,500 lbs. This is equivalent to 250 to 150 cans of the ordinary 1,000-lb. size. Each shovel takes up from 600 to 700 lbs. of ore, and two shovelful are required to fill a can. One advantage in this system is that there are no "windies" (cans only partly filled), every can being filled entirely, which adds to the efficiency of operation.

The cost of operating this machine is about equal to 30 hp. for power or sufficient air to run two machine drills. Two men are required to operate the machine, one to handle the shovel and one to break boulders and get the dirt in position to be taken up. A large amount of dirt can thus be handled, providing too much time is not lost in moving the machine from drift to drift, which is quite an undertaking. If the machine is kept close to a large number of drifts the

## Manjak Deposit in Trinidad.

BY JOHN CADMAN.\*

A series of fine, stiff, Tertiary clays, usually of a bluish color, weathering to a yellowish-brown, some 800 ft. or so in thickness, occurs in the north of San Fernando in the neighborhood of Marbella.

The dip of these clays is roughly from 20 to 50 degs. north-north-west.

Through these clays veins run in various directions, in which intrusions of liquid or semi-liquid bitumen have occurred. Solidification has taken place, and a mineral called "manjak" has been formed.

The physical structure of the manjak presents three distinct types: (1) An amorphous variety, resembling coal, from which the early discovery of the deposit led to the belief that a seam of coal was being worked; indeed, the mineral was



First Steam Shovel Underground in Missouri-Kansas District.

work will be continuous and can be accomplished at low cost.

The steam shovel cannot be operated in every mine, as certain conditions have to be met. The minimum height of roof is 14 ft., and work in a lower drift would be impossible, unless the machine were remodeled and the present form greatly changed. Thus, only a few sheet-ground mines could operate the shovel, as most of them have roofs from 7 to 9 ft. high. Another limitation is that the machine could not be operated where pillars are placed close together, as a swing of 25 to 35 ft. is necessary. Thus, in soft ground where there are many timbers the shovel could not be used at all.

Some apprehension has been felt throughout the district that the introduction of this machine will mean the displacement of shovelers, but from its limitations it can be seen that there is no danger of such a result.

sold as coal, until it was found that it melted and ran through the firebars of the furnace upon which it was used. (2) A columnar variety, to some extent resembling the amorphous variety, but occurring with perfect columnar jointing, running at right angles to the margin of the vein. Perfect hexagonal prisms are obtained, and the local name of "pencil manjak" has been given to this variety. (3) This variety, known as "lustrous" or Merivale manjak, resembles the Barbadoes manjak. It has a very bright luster and conchoidal fracture. This deposit appears to owe its origin to the petroleum bearing rocks lying below, from which the manjak, in a semi-fluid state, has intruded under pressure into the soft clays above, following the lines of weakness presented by the fissures.

\*Abstract of paper read before the British Inst. of M. E. June 4-5, 1908.

# Development of Montana Sapphire Industry.

By DOUGLAS B. STERRETT.\*

*Largely increased production. Geology of deposits, and operations of mines. Sapphires vary in size from 3 to 10 carats. Demand for small sizes.*

*Methods of recovering sapphires from their matrix. Woodbury jigs. Blake-Morscher concentrator.*

There was much activity in sapphire mining in Montana during 1907, with a consequent large production, both of the yogo-blue sapphires and of the varicolored sapphires found in other parts of the state. The output in 1907 was about 11,000,000 carats, valued at \$229,800. Two large companies operated mines containing blue sapphire in its original matrix, and other producers worked auriferous placer deposits containing varicolored sapphires.

The blue sapphire in matrix was worked in the Judith river region, in Fergus county, at points about 11 and 13 miles west-southwest of Utica, by the New Mine Sapphire Syndicate and the American Sapphire Co. Placer deposits of varicolored sapphires were operated on the head of Dry Cottonwood creek, Deer Lodge county, by the Variegated Sapphire Co., and along the West Fork of Rock Creek, in Granite county, by the American Gem Mining Syndicate. A little mining was done and a few finds reported from the auriferous sapphire deposits along the Missouri river, below Helena, once so extensively worked.

The blue sapphires of Fergus county, often called "Yogo sapphires," occur in a dike of basic igneous rock cutting nearly perpendicularly across the bedded limestone country rock. The dike crosses the canyon of Yogo creek (the north fork of Judith river) and the rolling country sloping eastward from the crest of Yogo canyon to the bottom lands of Judith river, a distance of nearly four miles.

The limestone country rock belongs to the Madison limestone formation of Carboniferous age. This formation is over 1,000 ft. thick, and consists of thinly bedded strata of light grayish limestone which dip rather gently to the east. There are a few minor folds in the limestone, some of which can be seen in the walls of Yogo canyon near the mine of the American Sapphire Co. The sapphire bearing dike is slightly sinuous and has a strike a little north of east with a nearly vertical dip. In the canyon, however, it seems to split up into two or more parts (one of which pinches out in the limestone) or to be intersected by another dike. The thickness of the main dike throughout its known length varies from 2 to over 14 ft.

When fresh and unaltered the rock of the sapphire bearing dike has a dark gray color with a greenish or bluish cast. The principal constituents are biotite mica and pyroxene, of the diopside variety, with minute and large inclusions of calcite, quartz, pyroxene, and pyrite. Some of the biotite occurs in phenocrysts of 2 or 3 mm. diameter, though the greater part is in small shining flakes, thickly scattered through the rock. The glistening scales of biotite and some of the inclusions are the principal constituents that can be recognized in hand specimens. The inclusions of calcite and quartz are surrounded by reaction rims

of pale and sometimes bright emerald green pyroxene. This pyroxene sometimes occurs scattered through the small-cr inclusions, or even constitutes the mass of them.

The dike rock contains numerous seams and veinlets of calcite and quartz as well as large inclusions of limestone. Pyrite in crystals and agglomerations of crystals is scattered through the rock. This pyrite, along with some pseudomorphous limonite, is separated from the rock along with the sapphires and constitutes the greater part of the concentrates obtained in washing for the latter. In their section under the microscope the biotite is strongly pleochroic, varying from almost colorless to a strong clear brown color. It occurs abundantly in ragged shreds through the rock, rarely with crystal form, and contains small apatite crystals. The pyroxene is pale greenish to colorless and belongs to the variety diopside.

The sapphires are scattered through the lamprophyre, none having been observed associated with the limestone inclusions. One sapphire crystal was seen embedded in a mass of heavily pyritized lamprophyre.

The sapphires range in size from minute crystals up to 4 or 5 carats. Rarely crystals of 8 or 10 carats are found, the majority, however, weighing under 3 carats. A large quantity of small sapphire, classed as "culs," is obtained. This material is in great demand for watch jewels, for which, through the flattened form of many of the crystals, it is especially suitable.

The color of the Yogo sapphire ranges from a light blue to the rich characteristic "cornflower" blue of the oriental sapphire. They make a beautiful gem and are highly prized for their color and brilliancy. Probably over 90% of the sapphire is of good blue color and gem quality, the remainder being grayish or of poor color. Occasional purplish colored gems are found.

The Yogo sapphires occur in rough crystals whose common forms are the base and a rare rhombohedral face  $x$  (3032). The basal planes are roughly striated parallel to their intersection with the rhombohedron faces. A repeated development of the base and rhombohedron is not uncommon. The basal planes are badly etched on some crystals, the etched figures generally showing a rhombohedral symmetry and several being sometimes grown together.

The writer wishes to acknowledge the

courtesy shown and the assistance rendered him by C. T. Gadsden, superintendent, at the time of his visit to the mine of the New Mine Sapphire Syndicate. The earlier mining operations of the syndicate consisted chiefly of open cuts, of which probably nearly a mile were made along the outcrop of the sapphire bearing dike. These cuts were from 10 to 60 ft. deep, in one place the dike material being removed to a depth of 90 ft. The walls of the cuts were held apart by stulls as needed.

At present the sapphire ore is all obtained by the New Mine Sapphire Syndicate from underground workings. The latter consist of a shaft 100 ft. deep with drifts in each direction from the bottom. The shaft is located in a smaller coulee or valley crossing the dike. The west drift is about 2,000 ft. long and nearly 200 ft. below the surface of the hill on the west of the coulee, while the levels above and one of the stops reach nearly to the bottom of the 90-ft. open cut in this hill. The east drift was carried nearly 800 ft., with stops above at varying intervals. At one place in this drift the dike has been stoped out to the surface. The nature of the dike as exposed in these workings is variable in both richness and size. Nearly barren places occur in the dike where the latter seems to be choped with limestone, between the fragments of which there is but little dike material. The barren places commonly occur where the dike pinches down to smaller dimensions, which changes in size were doubtless caused by the jamming of limestone fragments included in the magma in the narrower parts of the fissure at the time of intrusion.

In places the walls of the dike are rough where the edges of the limestone strata were broken during the fissuring and fragments were torn off by the intrusion of the dike. Jagged furrows or blowns in the limestone walls show where such fragments were torn off. In some places a single flat bedding plans of the limestone or stops, including several beds, form the bottom of these furrows; which are somewhat wedge-shaped toward the top.

A larger supply of ore was mined and treated during 1907 than ever before. Instead of containing vegetables injurious to vegetation, as claimed by some of the ranchers along the river below the mine, the slums have been shown actually to improve, for raising crops, the lands on which they are turned. Analysis of the slum is also reported to show the presence of nitrates and phosphates, which are helpful to any crop growth.

To test this, C. T. Gadsden, superintendent of the mine, turned the water carrying the slums over portions of the ranch land owned by the company. Oats, alfalfa, and vegetables were successfully grown, both where the slums were turned over crops already planted and where the vegetables were planted directly in thick deposits of slum. In each case vegetation was most luxuriant where the slum

\*Extract from Mineral Resources of U. S. for 1907.



was thickest. The coarser sands from the sapphire washings were removed by a sand trap from the sluice ditches, where the grade was low, to keep the latter from clogging up. This was accomplished automatically by a simple device operated by an undershot waterwheel in the sluice.

In some respects the method of separating the sapphires from their matrix is similar to that of separating diamonds from the "blue earth" of South Africa. Near the surface and to a depth of 20 ft. and more, the dike rock was decomposed by weathering to a yellow clay, from which the sapphires were readily washed. As the work was carried deeper, the dike rock was less altered and hard, so that it has been found necessary to disintegrate it in some way before washing.

This is accomplished by exposing piles of ore to the weather with occasional wettings. The action of moisture and air, aided by the frequent freezings and thawings of the winter climate, soon starts the slacking and disintegration of the lumps of "blue," as the ore is called. The disintegration is carried out on inclined floors or settling grounds, where the ore is deposited after removal from the mine. After an exposure of several months, a large stream of water is turned on the piles of "blue," which are forked over at the same time. The disintegrated surfaces of the lumps are washed off and down through a sluice along with other loose disintegrated material. This leaves the "blue" in apparently hard fresh lumps, which, however, soon begin to disintegrate and crumble again. The material in the sluice is carried over a set of riffles to a settling dam, where the lump material brought down undergoes further disintegration. From the first settling dam the "blue" is washed down over riffles to a second, for final disintegration.

The sluices are made of board and have iron plate bottoms. Iron riffles are placed at the proper places in the sluice to catch the sapphires, and clean-ups are made four or more times in 24 hours. The concentrates are separated in a rock sieve into three sizes, and each grade is panned down closer over a wooden tank. The oversize left on a screen of  $\frac{3}{8}$ -in. mesh is carefully examined for large sapphires before discarding. The contents of the tank in which the panning is done receive further treatment on screens of two different meshes from those first used. Sapphires are picked up by hand from the coarse sizes of concentrates before shipping. The small sizes containing the culls for watch jewels are shipped in the rough. All the sapphires go to the company's office in London for cutting and marketing.

Through the courtesy of John T. Morrow and C. H. Burr, consulting and attendant engineers for the American Sapphire Co., the writer was shown through the plant and was assisted in the preparation of the following notes. The plant of this company, operating on the same vein bearing dike as the New Mine Sapphire Syndicate, is located in the canyon of Yogo creek.

The early work by former owners on this portion of the sapphire bearing dike

consisted of shafts and openings on the east side of the canyon. Some of these were near the edge of the bench land above, and others in the canyon walls. Prospects and shafts were also made across Yogo canyon and along a tributary gulch to the west. Three different dikes are reported to have been located. One of these, in the bottom of the tributary canyon, was opened several years ago by a shaft about 100 ft. deep, and good sapphire ore was found.

The mining of the dike rock by the present company is accomplished by drifts with stopes under the cliff on the east side of the canyon and a shaft at the mouth of the drift a little above the bottom of the canyon. This shaft was about 70 ft. deep in September, 1907, and in pay ore. It was reported that the depth was about 100 ft. early in 1908, and that the shaft was equipped with an electrical hoist capable of sinking to 1,000 ft. The level of the workings in the canyon is about 265 ft. below the mouth of the old shaft on the cliff. The main drift has been carried to the east nearly 500 ft., with many hundred feet of levels and stopes above.

The dike is somewhat irregular in shape and contains alternate rich and barren portions. The latter seem to be due, in places, to abundant inclusions of limestone, while in other places the dike pinches around projecting portions of the limestone walls. The outcrop of the dike in the foot of the canyon wall was not at first located, since it was rather indefinite and was partly covered with large blocks of talus. A crosscut tunnel was driven from the north side until the dike was located, and from this the main drift was carried eastward on the one side, and the dike traced to its outcrop in the canyon wall on the other. A large body of pay rock, apparently over 45 ft. wide, was located by the cross-cut and drift.

Though the relation of this ore body to the dike was not definitely known at the time of the writer's visit, it seemed to cut across the regular dike with a dip of about 10 deg. to the east. No definite hanging wall had been located, though the pay streak was about 12 ft. thick from the foot-wall. This body of ore had been brecciated and the broken masses squeezed into slickensided lenses.

The mine is equipped with a track running to the mill nearby. The track is protected between these points by a shed, in order that severe weather may not interfere with operations. The ore is handled in steel dump cars of improved pattern.

The method of treating the sapphire ore is quite different from that used by the New Mine Sapphire Syndicate, the ore receiving special mill treatment soon after mining. It has been found that over 50% of the ore removed by blasting is fine enough for milling without disintegration by weathering.

The ore direct from the mine, after passing through 4-in. grizzlies, is digested with water in heavy revolving screens. The latter discharge three classes of material, the fines or slimes, which are immediately discarded, the oversize or material still in lumps, which is saved for further treatment, and the digested mat-

ter ready for sizing and concentration. The lump material is left in stock piles to weather for a period of several months, by which time it is readily digested in the revolving screens and concentrated.

After sizing, the digested material is concentrated on Woodbury jigs arranged to treat three sizes,  $\frac{3}{8}$  and  $\frac{1}{2}$ -in. and 6-mesh. Two jigs are run in series for safety. These jigs were handling about 75 tons in a day of 7½ hours at the time of the visit, though from 200 to 225 tons could be treated in 24 hours.

The concentrates from the jigs, in rare cases, run as high as 30% sapphire, 5 to 10% being more common. The concentrates containing the watch-jewel sizes, or culls, are treated on a Blake-Morse electrostatic concentrator and their grade brought up to between 50 and 90% sapphire.

The final cleaning, as with the larger sizes suitable for cutting, is accomplished by hand picking. In filling hurry orders this cleaner is of value, since it enables a large quantity of sapphire to be selected much more quickly than could be done by hand alone. On the other hand, part of the sapphire goes over with the tailings, which require more labor to pick over than the original concentrates.

The operations of the American Sapphire Co. have not yet reached the capacity of the plant, since much time has been consumed in perfecting the method of concentration in use and in exploratory work in the mine. The production of sapphires suitable for cutting amounted to over 100,000 carats between April and December of 1907. In addition, several thousand ounces of culls for watch jewels, bearings, and instruments of precision, were obtained at the same time.

The auriferous placer sapphire deposits on Dry Cottonwood creek, 16 miles north 70 deg. east of Anaconda, were exploited with a dredge during 1907 by the Variegated Sapphire Co. under the management of William Dodd. The deposits are located at an elevation of over 6,000 ft., nearly 1,500 ft. above the valley of Deer Lodge river, to which Dry Cottonwood creek is tributary. The company owns some two miles of gulch land with beds of gravel 40 to 100 ft. wide and from 10 to 14 ft. thick. The gravels in some of the gulches to the side of the company's land and in the flats below are also reported as carrying sapphires.

The country rock in the region around the mine is a quartz porphyry, in places nearly a biotite granite. This porphyry is rather fine grained and composed of quartz and feldspar-phenocrysts, with biotite laths and crystals in a ground mass. The quartz occurs in clear, glassy crystals and rounded grains, some of them fractured, thickly scattered through the rock. The feldspar, chiefly a plagioclase, has largely decomposed to kaolin in the surface rock examined.

The gravels in the gulch consist chiefly of blocks of porphyry, some of them rounded into cobbles, others flat and slab-like with but partially rounded corners. The overburden or top of the deposit, consisting chiefly of black muck with but little gravel through it, is 3 to 4 ft. thick.

The dredge used by the company is of the bucket type, and has a capacity of

750 cu. yds. in 24 hours. It is operated by a steam engine, and has a dynamo for its electric light equipment. The material from the dredge buckets goes to a revolving screen from which everything over 1 in. in diameter is separated and turned into the pond under water at the back of the dredge, while everything under 1 in. in diameter is run over 56 ft. of riffles. The debris from the sluice and the riffles is piled on the coarse material at the back of the dredge. In this way a dam is built which retains the water in the pond on which the dredge floats.

By excavating before and constructing a dam behind, the dredge will be worked up the gulch. The grade of the gulch is not light, and the flow of the creek during the summer is quite small. The dredge cuts a square face in the gravels across the gulch. The overburden is first removed for a width of 6 ft. upstream, being run directly through the dredge without washing. Mercury is placed in the riffles to catch gold, and clean-ups are made weekly. The sapphire concentrates are washed from the sluices of the dredge into a bin and are later sieved and panned down.

The gold recovered from concentrates is mostly fine, though nuggets worth several dollars have been reported. It is said the value of the gold obtained is sufficient to pay operating expenses. The larger part of the sapphire, either on account of small size or poor color, is suitable for mechanical purposes only, as watch and meter bearings. Some of the sapphires are suitable in size, quality, and color for cutting as gems.

The predominant colors of the Dry Cottonwood sapphires are deep and light aquamarine and pale yellowish green. Other colors are clear and sunsy light, light and dark topaz yellow, straw yellow, yellowish green like olive, light and dark pink; some stones are nearly ruby red, lilac and pale amethystine, and some are colorless. The pleochroism of some of the sapphires is marked, the same crystal appearing greenish when viewed across the prism and blue through its length, or pale and deeper pink, as the case might be. It is not unusual to find aquamarine colored stones with a pink spot in the center. This combination furnishes an attractive gem when cut. A feature of the deep pink colored sapphires is their rich and beautiful color under artificial light, even when not very attractive in natural light.

The sapphires occur in rough crystals, often with curved faces, as irregular rounded masses, and as waterworn pebbles. The surfaces of those which are not waterworn are very much etched and corroded. One yellowish-green sapphire crystal, weighing a little over 4½ carats, had very much the shape of a rough diamond crystal. This effect is largely due to the fact that the development of the basal and rhombohedral faces produced a form resembling an octohedron. This apparent octohedral form along with marked curvature of the faces and peculiar etching produces the effect described. The proportion of waterworn sapphires is not large, and only a few show a large amount of wear. A few red and cinnamon-red garnets, mostly small,

are found in the concentrates with the sapphires.

The operations of the American Gem Mining Syndicate in 1907 for sapphires were confined to two gulches on the north side of the West Fork of Rock creek, in Granite county, about 15 miles southwest of Phillipsburg. These gulches are nearly a mile apart and are known as Anaconda gulch on the west and Meyer gulch on the east. Both drain to the south, Anaconda gulch with a rather steep grade cutting through a small stretch of flat country along part of its course. Sapphires are said to have been found in the gulches and scattered over the surface of an area of about two square miles in this region.

The country rock around the sapphire deposits consists of coarse and fine grain porphyry, porphyritic tuff, conglomerate, quartzite, silicious slate, and black limestone, the geological relations of which have not been worked out. In and near Anaconda gulch the rocks underlying parts of the sapphire deposits are conglomerate, porphyritic tuff resembling conglomerate where the inclusions are plentiful, and porphyry. The bed rock in the lower part of Meyer gulch is a dense, silicious slaty rock of purplish color with a little black limestone.

To the west of the sapphire bearing deposits on the flats near Anaconda gulch is rather coarse porphyry, probably granite porphyry, and to the north is fine porphyry. Ledges of tuff or conglomerate outcrop at one place on the flats where sapphires have been worked, and the gravels over part of the flats contain angular to subangular debris of porphyry, tuff, and conglomerate.

The porphyritic tuff is composed of feldspar and glassy quartz phenocrysts in a fine slate gray matrix with inclusions of quartzite and other material. The inclusions observed range from 1 or 2-in. down in size, and the phenocrysts average about 1-16 in. across. The conglomerate at the sapphire deposits is composed of pebbles of quartz, red, brown, and gray sandstone and quartzite, gray and black chert, and a serpentine-like material, with a silicious cement, the whole containing decomposed feldspar fragments throughout. The pebbles range in size from about 2 in. down.

About a mile to the east of the mine is a bed of very coarse conglomerate forming cliffs 60 to 70 ft. high along the north side of the West Fork. The pebbles of this conglomerate are composed of sandstone, quartzite, silicious slate, and chert, with a compact, hard, red, jaspery matrix. These pebbles are well rounded and range in size up to 10 and 12 in. diameter. While a number of them are very similar to those of the finer conglomerate at the sapphire mine, the frequent quartz pebbles of the latter seem to be lacking. There are pebbles and fragments of light yellowish and greenish-gray to green serpentine-like mineral included in the coarse conglomerate to the east of and in the conglomerate and tuff at the sapphire mine. Large blocks of apparently the same material were found on the flats at the mine. The latter consisted of a fine-grained greenish-gray matrix with translucent dark green blocks, resembling

crystal fragments, included in it. Both the matrix and the inclusions were soft and like serpentine. In thin section the greenish inclusions were seen to be very fragmentary with a light, porous, kaolin-like looking material between the fragments. The latter were composed of many small, doubly refracting particles and fibers extinguishing at all angles.

The gravels in Anaconda gulch vary from 30 to 100 ft. wide and from a few inches to 8 or 10 ft. thick. At the bends and in some of the hollows along the gulch gravel bars extend up the hillsides short distances. On portions of the flats along the gulch gravel beds occur, and good deposits of sapphire are reported to exist in channels leading to the gulch. At one place on the flats the gravels, and probably also the decayed tuff or conglomerate, have been washed for sapphires over an area of a number of feet square.

The gravel in Meyer gulch are from 30 to 40 ft. wide in the lower part and from 100 to 200 ft. wide farther up the gulch. In thickness they vary from 1 to 2 ft. up to 8 or 10 ft., and are probably as much as 5 ft. thick over a large portion of the area.

The gravels in both Anaconda and Meyer gulches are sluiced down with small hydraulics. The first part of the sluice is over bed rock and from this portion the boulders and coarse debris are forked out. The finer material is then washed down through board sluices over cross riffles. The latter are removed and cleaned up each day.

In Meyer gulch the tailings from the riffles are carried through several hundred yards of wooden sluice to remove the waste from the gulch near the workings. This sluice has riffles with bars parallel to its length, largely to protect the boards of which it is constructed, though partly to catch sapphires that have washed over the cross riffles. The parallel riffles are cleaned up at wide intervals of time. All of the concentrates are further cleaned on a jig operated by a small water wheel. The concentrates from the jig are oven-dried and shipped for picking. Gold is also saved from the concentrates. The tailings from the jigs contain rutile in elongated, much water-worn pebbles, scaly hematite in quartz, garnet, corundum, pyrite, manganese ore, silicious iron pebbles, and other minerals.

The sapphires from the Rock creek region are principally used for mechanical purposes, though some are of good color and quality and of sufficient size to be cut as gem stones. The prevailing color is some shade of green, as the yellowish and bluish green of beryl and aquamarine. Blue, yellow, purple, pink, and red sapphires are found, however. The greater part of the sapphires are shipped to Switzerland, where they are cut for use as watch jewels and for other bearings.

Mica amounting to 327,610 lb., valued at \$155,114, was imported into the United States in seven months this year.

America imported 118,632 tons manganese ore in seven months this year.

# Making Coke in Byproduct Ovens in the U. S.

By EDWARD W. PARKER.\*

According to reports received from the manufacturers of coke in byproduct ovens the total number of this type of oven completed to the close of 1907 in the United States was 3,892, against 3,693 in 1906, an increase of 299 ovens. The production of byproduct coke in 1907 was 5,697,899 short tons, as against 4,598,127 tons in 1906; an increase of 1,099,772 tons, or 23%. Of the 3,892 ovens in 1907, 81 were idle, these being 25 Semet-Solvay ovens at Sharon, Pa., and 56 Newton-Chambers at Pocahontas, Va., which have not been in practical operation since they were first installed.

The production of byproduct coke in 1907 was from 3,811 active ovens, the average output from each of which was 1,472 tons of coke, as compared with the average production for each oven in 1906 of 1,266 tons. The average production from beehive ovens in blast in 1907 was 286.8 tons, as compared with 273.6 tons in 1906.

The quantity of coal consumed in the manufacture of the 5,697,899 tons of byproduct coke in 1907 was 7,596,174 tons, indicating a yield of coal in coke of 75%. In 1906 the average yield of coal in coke was 73.6%. This is a much larger yield than it is possible to obtain in beehive ovens, as a portion of the fixed carbon in the coal is unavoidably burned in beehive oven practice, while in the retort oven the operation is one of distillation only without the admission of air, and all of the fixed carbon remains as coke.

The writer again calls attention to the tenacity with which coke manufacturers of the United States cling to the beehive oven practice of coke making and to the comparatively slow increase which has characterized the retort oven method. The amount of new work under way during the last four years has shown a marked decrease as compared with the preceding four years. At the end of 1905 there were only 417 ovens under construction, and at the end of 1906 the number was reduced to 112. Some additional new work was begun in 1907, and the ovens under construction at the close of that year was 330, of which 280 were the experimental plant of Koppers regenerative byproduct ovens building by the Illinois Steel Co., at Joliet, Ill.,<sup>1</sup> it being reported that it was the intention of the United States Steel Corporation to construct 1,000 of this type at Gary, Ind., if this experimental plant proved satisfactory. The other 50 ovens building at the close of 1907 are an addition to the United Otto plant at Hamilton, Ohio, doubling the number of ovens at this place.

When the economies which may be effected by the use of the retort ovens have been so clearly demonstrated, not only by the plants which have been constructed in the United States, but more emphatically through the much more extensive development of byproduct coke

*Domestic output of byproduct coke increased 23 per cent last year. Of coal consumed the coke yield was 75 per cent which is in excess of that obtained in beehive ovens.*

*Types of byproduct coke ovens. Recovery of gas, tar and ammonia.*

manufacture in Europe, the condition in the United States, as shown by the statistics for the last four years, is somewhat difficult to understand. The total value of byproducts obtained in the manufacture of this coke in 1907 was \$7,548,671, distributed as follows: Gas, 20,516,731 cu. ft., \$3,136,829; tar, 53,295,795 gal., \$1,212,539; ammonia, sulphate or reduced to equivalent in sulphate, 125,372,369 lbs., \$3,171,702.

The gas included in the foregoing statement is the "surplus" not consumed in the coking process, and which is either sold or used at manufacturing establishments operated in connection with the coke oven plant. In a few instances where the surplus gas is consumed by the producing companies the quantity is not measured, nor was any value placed upon it in the reports made to the Survey. In such cases careful estimates have been made, based upon the average surplus gas obtained from similar coals used at ovens of the same type. The value, similarly estimated, has been placed at from 10 to 15 cents per 1,000 cu. ft.

The coal consumed in retort ovens in 1907 amounted to 7,400,587 short tons. The quantity of coal used in beehive ovens was 54,485,522 tons, from all of which the possible byproducts are apparently wasted. Assuming that the coal consumed in beehive ovens was of the same average quality as that charged into the retort ovens and that the prices would be not less than 80% of those ruling in 1907, the value of recoverable products which were thus apparently wasted last year amounted to \$14,000,000, a sum equal to nearly 80% of the total value of all the coal used in beehive ovens during the year. At the prices which prevailed in 1907 the value of the byproducts wasted in beehive coke ovens was a little over \$35,000,000.

The value of the byproducts from the retort ovens in 1907 was a little more than one-third the value of the coke produced in them.

It should be remembered, however, that beehive ovens are located in the coal mining regions and that the cost of the coal charged into them represents only a little more than that represented by the expense of mining the coal, whereas in locating byproduct recovery plants provision must be made for utilizing or marketing the byproducts. It is for this reason that in the much larger number of cases the recovery plants are established near the larger cities and at considerable

distances from the mining regions, and the expense of transportation is added to the mining cost of the coal. Hence it is that the value of the 7,596,174 tons of coal charged into byproduct ovens in 1907 was \$15,874,430, or over \$2 per ton, while the 54,485,522 tons of coal used in beehive ovens was \$36,956,000, or \$1.05 per ton.

It must also be remembered that the original cost of installation for a byproduct recovery plant is from four to five times that of a beehive plant of equal capacity. These disadvantages are in turn partly offset by the higher percentage yield of coke in the retort ovens and a lower delivery charge on the coke produced. In the case of beehive coke, railroad transportation expense is borne by the coke, while in retort oven practice all, or nearly all, of the freight charge is borne by the coal.

The total value of the 5,697,899 tons of byproduct coke produced in 1907 was \$21,665,157, an average of \$3.86 per ton. The value of the 35,171,665 tons of beehive coke made in 1907 was \$89,873,969, or \$2.56 per ton. If we consider that the difference in the value of the byproduct coke and beehive coke was due only to the difference in freight charges, then the total value of the entire product of beehive coke made in 1907 would, if made in retort ovens close to the market, have been worth \$135,750,000. Add to this the value of the byproducts that should have been recovered of \$44,000,000, at 80% of the market price in 1907, the total value of the coke and byproducts would have amounted to nearly \$180,000,000 instead of \$89,873,969 for the beehive coke alone. The value of the coal charged into these ovens would have been \$108,879,870 instead of \$56,956,000.

Carrying the hypothesis further, the difference between the value of the coke and byproducts if the coal had been coked in retort ovens and the value of the coke alone from the beehive ovens was, say, \$80,000,000. From this should be deducted the difference between what the value of the coal would have been at retort ovens, and what it was at beehive ovens, that is, \$52,000,000. The remainder (\$38,000,000) less the difference in operating expenses, wear and tear, interest on capital, etc., may be considered as approximately the actual net loss in value as the result of beehive coke production compared with byproduct coke practice in 1907.

One of the reasons that has been given for the apparent lack of progress in retort oven building in the last four years is the absence of profitable markets for the byproducts of coal tar, and this has contributed to the backwardness of the United States in the development of the chemical industries depending upon coal tar as a raw material, and yet this country is importing coal tar products to the value of several million dollars annually. It is also well known that the development of the coal briquetting industry has been retarded because of the lack of assurance of a satisfactory supply of suit-

\*Extract from Mineral Resources of U. S. for 1907.

<sup>1</sup> Described in The Mining World, Sept. 19, 1905.—Editor.

able coal tar pitch for binding material, and there is also an increasing demand for creosoting oils for the preservation of timber.

There does not appear to be any trouble in disposing of the ammonia, for which a good demand exists, and the practicability of long distance transmission of the gas has been successfully demonstrated, thus insuring markets for the surplus of this retort oven product. The United Otto oven plant at Camden, N. J., is distributing gas to Plainfield, New Brunswick, and other cities and towns, the maximum distance being 83 miles.

At the present time, when the conservation of the natural resources of the United States is being so earnestly discussed, this matter of waste in coke manufacture is one which might well be given serious consideration.

The first plant of byproduct ovens built in the United States was one of 22 Semet-Solway ovens at Syracuse, N. Y. It was completed in 1893, and the production in that year amounted to 12,850 tons. This plant has since been increased to 40 ovens. The first plant of United Otto ovens was constructed at Johnstown, Pa., and consisted of 60 ovens operated in connection with the (now) Cambria Steel Co.

The main difference in these two types of oven lies in the arrangement of the flues for the combustion of the gases used in heating them. In one the flues are vertical and in the other they are horizontal. Most of the byproduct ovens constructed in this country have been one of these two designs.

At the close of 1907 there were 1,270 Semet-Solway ovens in operation, with 25 idle; of the United Otto type there were 2,002 completed and 50 building. In addition to these there were 387 Rothberg ovens in operation during the year, but no new ones of this type were under construction. There were also 152 Newton-Chambers ovens in operation at Vintondale, Pa., during 1907, but no byproducts, except of an experimental character, were obtained. The plant of 56 Newton-Chambers ovens constructed at Pocahontas, Va., has not been in operation for several years.

### Abrasive Garnet.

The production of garnet, reported for abrasive purposes in the United States in 1907 was 7,058 short tons, valued at \$211,686, according to the U. S. Geological Survey. This is the highest production ever recorded, exceeding that of 1906 by 2,408 tons, or 52%, in quantity, and by \$54,686, or 35%, in value. The average price per ton of the garnet was \$30.34, which is about the mean of the minimum and maximum quotations (depending on quality) on ordinary wholesale lots in New York during the year. The garnet mined came from New York, Pennsylvania, and North Carolina.

The production of garnet for abrasive purposes is a well-established industry in the Adirondack region of New York. The seat of the industry is in Warren and Essex counties near the upper Hudson valley, and North Creek, the terminus of the Adirondack branch of the Dela-

ware & Hudson railroad, is the principal point of shipment.

The garnet produced is almandine, the iron aluminum variety, with the symbol  $3\text{FeO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2$ . Ordinarily garnet has a hardness of 6.5 to 7.5, but it is claimed that the Adirondack garnet is harder than this, occurring from 7.5 to 8 in the scale, thus lying intermediate between quartz (7) and corundum (9). The garnet is usually associated with amphibolite, which occurs in lens-shaped bodies in a country rock of acid gneiss. The amphibolite has been metamorphosed, as is usual with garnet bearing rocks. The mineral occurs in crystals ranging from 1 in. upward in diameter, and the larger crystals have been so strained and shattered by compression that they readily crumble into small fragments.

In working the deposits the country rock is broken down by the ordinary quarry methods of picking or blasting. The rock is then crushed sufficiently fine to release the garnets, and the product is washed. The garnet is recovered either by hand sorting or by mechanical means. Some difficulty has in the past been encountered in separating the garnet from the accompanying hornblende, but the North River Garnet Co. has solved the difficulty by employing crushers and then concentrating on a special type of jig.

The output is used in the shoe and wood-working industries, and sold in the form of garnet paper. The mineral does not possess any distinct mineral cleavage, but there is a rather distinct parting parallel to the dodecahedral faces which is usually well developed in the Adirondack mineral. This insures a smooth surface for attachment to the cloth or paper and at the same time leaves a sharp cutting edge. The resultant efficiency is said to be much greater than that of ordinary sand paper.

The output of the region, as already mentioned, comes from Essex and Warren counties. The North River Garnet Co. has a mine at Thirteenth lake, Warren county, so situated that it is practicable to work it throughout the year; but at other points, as at Gore mountain and Garnet Peak, where the garnet is obtained by open-cut work and hand sorting, winter work is not practicable.

In 1905 exploratory work was done on a type of deposits somewhat different from those described. The locality is on the east slope of Mount Bigelow 5 1/2 miles south of Keeseville, near Lake Champlain. During 1906 the property was under development, and the first reports to the United States Geological Survey of production from this area were received from E. Schaaf-Regelman and George W. Smith, and are contained in the figures for 1907. The garnet from this locality is known to the trade as "massive garnet," and the product is of exceptional purity.

The production of garnet from North Carolina in 1907, reported to the Survey, came from Marshall, Madison county. The deposits were operated by the Highland Development Co. of Boston. There was no production in 1906, but the industry was on a substantial basis in 1907.

The production from Pennsylvania was

reported from Chelsea, a small town situated in the extreme southeastern part of the state in Delaware county and near the state line between Pennsylvania and Delaware. The garnet is the ruby or rose colored variety and is found in gneiss.

### Coke Making in Virginia.

As a result of the financial stress during the closing months of 1907, the production of coke in Virginia was less by 32,379 short tons, or 2.1%, than in the preceding year, amounting to but 1,543,288 tons in 1907, as against 1,577,659 tons in 1906, according to the United States Geological Survey.

Owing, however, to the better prices that prevailed during the greater part of the year, the value of the coke produced in 1907 shows an increase of \$154,074—from \$3,611,659 in 1906 to \$3,765,733 in 1907. The number of establishments increased from 18 in 1906 to 19 in 1907, and the total number of ovens from 4,641 in the earlier year to 5,333 in the later. One establishment of 400 ovens was idle throughout the year. All of the coal used in the manufacture of coke in Virginia in 1907—2,264,720 tons—was unwashed; 1,271,318 tons was run-of-mine and 993,202 tons slack.

All the coking coals of Virginia are contained within a few counties in the extreme southwestern portion of the state, the coal fields being within the Appalachian province. The greater part of the development which has resulted in actual production during the last few years has been carried on in Wise county, on the Clinch Valley branch of the Norfolk & Western railway. The coke in this district is the only coke made at the present time from coal mined exclusively within the state. There are two plants in Virginia, one at Lowmoor and one at Covington, the coal for which is drawn from the mines in the New River district of West Virginia.

The coal for the ovens at Pocahontas and part of the Flat Top district of Tazewell county is obtained from mines whose workings extend across the state boundary line into West Virginia, and a part of this coal production should properly be credited to West Virginia. The openings of the mines, however, and the coke ovens are in Tazewell county, and it is customary to credit the coal as well as the coke to Virginia. The total production of coke in Wise county in 1907 amounted to 1,353,225 tons, or 87.6% of the total for the state.

It seems probable that the development work that has been in progress in the Black Mountain region of Lee county and in Wise county during the last few years will before long result in marked increase in the coke production of Virginia.

Tin production in the Federated Malay states for seven months this year amounted to 30,218 long tons, an increase of 2,461 tons as compared with 1907.

It costs from \$1 to \$1.50 per ton to briquet zinc-lead concentrates for smelting at Broken Hill, New South Wales.

# Shop Talks, No. 4—Chalmers & Williams, Chicago

By GEO. E. EDWARDS.

The notable increase in the mineral production of the United States during the past ten years of over 134%—from \$724,278,854 in 1896 to \$2,087,119,999 in 1907—is responsible for the wonderful advancement made in the manufacture of mining machinery. In few of the industries has such great progress been made. When it is taken into consideration that the cost of machinery is a very large factor in the successful operation of a mining property, and that the production figures for the past ten years total over \$13,000,000,000, some idea of the magnitude of the machinery end of the industry may be gained.

A typical illustration of an up-to-date mining machinery manufacturing plant is that of Chalmers & Williams at Chicago

annex, carpenter shop, pipe fitting shop and storage warehouse, in all about 250,000 sq. ft. of floor space. The power and boiler house is equipped with three tubular boilers, supplying an aggregate of 300 hp., and two vertical Corliss engines, belt connected to generators of 110 kw. each. The foundry is equipped with a 35-ton cupola and two electric traveling cranes of 30 and 20 tons capacity respectively. The machine shop is equipped throughout with tools, of modern design, and two traveling cranes, all electrically driven. The smith shop equipment is also of the latest design, electrically driven, and with proper crane service. A 10-ton electric derrick, having a radius of 50 ft., is located in the foundry yard adjacent to the railroad tracks for the economical and rapid handling of large flasks and castings.

The company manufactures all kinds of

machinery for the systematic reduction of ores by processes of milling, concentration, cyaniding, smelting, etc. With practically its entire staff—management, engineers, salesmen, and even superintendent of shops—formerly identified with the well-known firm of Fraser & Chalmers, the company has devoted its efforts exclusively to this one specialty.

Such other machinery as they do not manufacture, but which enters into the complete installation they supply, such as power plants, both steam and electric, hoisting and pumping engines, air compressors, etc., is obtained from those concerns who are specialists like themselves in their respective lines.

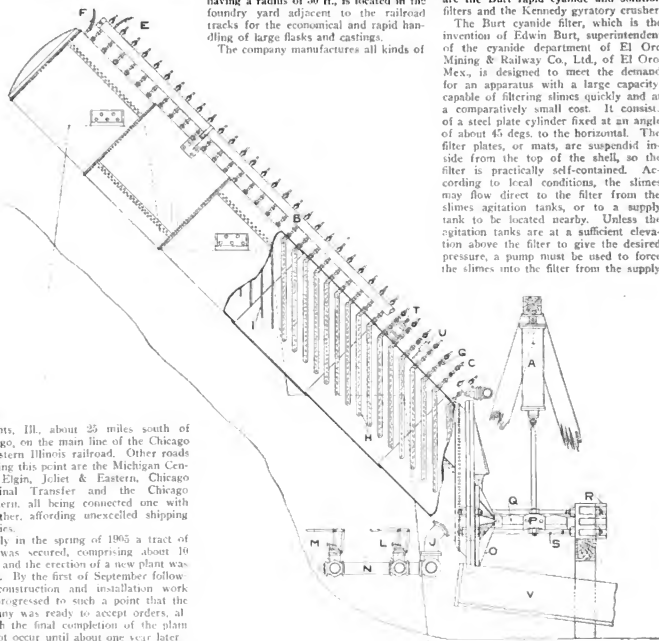
Among the more important patented specialties manufactured by the company are the Burt rapid cyanide and solution filters and the Kennedy gyratory crusher.

The Burt cyanide filter, which is the invention of Edwin Burt, superintendent of the cyanide department of El Oro Mining & Railway Co., Ltd., of El Oro, Mex., is designed to meet the demand for an apparatus with a large capacity, capable of filtering slimes quickly and at a comparatively small cost. It consists of a steel plate cylinder fixed at an angle of about 45 degs. to the horizontal. The filter plates, or mats, are suspended inside from the top of the shell, so the filter is practically self-contained. According to local conditions, the slimes may flow direct to the filter from the slimes agitation tanks, or to a supply tank to be located nearby. Unless the agitation tanks are at a sufficient elevation above the filter to give the desired pressure, a pump must be used to force the slimes into the filter from the supply

Heights, Ill., about 25 miles south of Chicago, on the main line of the Chicago & Eastern Illinois railroad. Other roads reaching this point are the Michigan Central, Elgin, Joliet & Eastern, Chicago Terminal Transfer and the Chicago Southern, all being connected one with the other, affording unexcelled shipping facilities.

Early in the spring of 1905 a tract of land was secured, comprising about 10 acres, and the erection of a new plant was begun. By the first of September following, construction and installation work had progressed to such a point that the company was ready to accept orders, although the final completion of the plant did not occur until about one year later.

The plant at the present time consists of boiler and power house, pattern house, foundry, smith shop, machine shop and



Burt Rapid Cyanide Filter.

tank. The pressure used in the filter is from 30 to 60 lb.

One of the features of this filter is its ability to handle all kinds of slimes. It is immaterial whether the slime is due to talc or clay in the ore, which produces an almost impermeable cake, or whether it is the result of fine crushing, which usually gives a large percentage of granular matter, the results are the same. Naturally a thinner cake is formed from the former and less capacity would be obtained than when treating a granular product. In using pressure filters any pressure can be used within a reasonable limit and there is no limitation due to altitude.

The construction of these filters is very simple and there are few parts to get out of order. The method of operation is simple and easily learned and repairs and renewals are easily made.

The Kennedy gyratory crusher was designed to meet a demand for a stronger and more durable crusher of the gyratory type, to handle large quantities of rock and ore without the attendant difficulties encountered in some of the older types. In its manufacture a slightly heavier spider is used, and is so placed that the concaves can be taken out or replaced without interfering with a spider or the shaft and head. The head is fastened on the shaft by casting it slightly larger than the shaft and by inserting a steel ring at the bottom which is bored down to fit the shaft. The void above the ring between the shaft and the head is filled in with zinc, so that the head is to the shaft what a splint would be to a broken arm. The top of the head is cored out so that when the nut is screwed down to keep the head from moving upward on the shaft, a tap bolt may be screwed through which will extend down into one of the core holes, and should the head turn on the shaft the nut will turn with the head and screw itself down, tightening the head, making it self-locking.

The Kennedy crusher differs from other crushers in that the dust collar is double and a ring of Garlock packing is inserted which takes the thrust of the shaft, making it easily renewable. It is directly above the eccentric and is made double with two rings of packing, making the eccentric nearly dust proof, if not entirely so. The bearing sleeve on the outside contains an eccentric ball on the inside which oscillates and is self-aligning, not only making the machine run easy but prevents binding and undue strain in the eccentric or eccentric sleeve. The countershaft of the crusher has long, double bearings, and an oil well under the countershaft is provided from which oil is taken to the countershaft with wick, chain or ring oilers.

To give a better idea as to the scope of the machinery manufactured by the company, a partial list is given herewith: Stamp mills, from a prospecting outfit to the latest 1,250 lb. battery; Blake and Dodge crushers; bullion, water-jacket and reverberatory furnaces; hydraulic separators and classifiers; ore feeders; Chilian mills; crushing rolls; cyanide tanks; Huntington mills; hoisting cages; jigs; grizzlies; cement dryers and kilns;

screens; slime tables; Frue vanners, etc. Nearly all this machinery can be sectionalized for mule back transportation, the limit of weight not exceeding 300 lb.

Among the notable installations made by the company are the following: Arizona Copper Co., Ltd., 14 6-ft. Anaconda type Huntington mills and 6 set crushing rolls; Nevada Cons. Copper Co., 8 sets crushing rolls; Moctezuma Copper Co., 6 sets crushing rolls; Bunker Hill & Sullivan Mining & Concentrating Co., complete regrinding plant; Guanajuato Cons. Mining & Milling Co., 40 stamp mill; Chas. Butters & Co., Ltd., 20 stamp mill; El Oro Mining & Railway Co., Ltd., 20 stamp mill; Amparo Mining Co., 40 stamp mill, complete with cyanide plant; Guanajuato Reduction & Mines Co., 80 stamp mill; Mexico Mines of El Oro, Ltd., 20 stamp mill; El Palmarito Mining Co., complete lixiviation plant; Cerbat

trating machinery; section H., hoisting cages and landing dogs; section J., rapid cyanide filter; section K., Chile mills; section I., Kennedy gyratory crusher.

The company's general offices are located at 195 Clark street, Chicago.

### German Zinc Trade.

According to Paul Speier of Breslau, the foreign trade in zinc and zinc products of Germany for the seven months ending with July was, in metric tons, as below:

	Imports.	Exports.
Spelter .....	15,701	37,072
Zinc sheets .....	223	9,447
Zinc scrap .....	904	3,187
Zinc dust .....	671	1,425
Lithopone .....	1,135	5,316
Zinc oxide .....	3,252	9,611
Zinc ore .....	106,875	17,919

Compared with the corresponding period last year, spelter shows a decrease of 7,409 tons in imports and an increase of



Kennedy Gyratory Crusher.

Mountain Mining Co., complete concentrating plant; Kimberly Cons. Mines Co., complete magnetic separating plant; Utah Apex Mining Co., complete concentrating plant; Cia. Minera Las Dos Estrellas, S. A., 4 54"x35" cyanide filters; Copper Queen Cons. Mining Co., 50 water jackets; Mammoth Copper Mining Co., 32 water jackets.

The company's latest catalog is issued in sections as follows: Section A. is devoted to rock breakers; section B, stamp batteries and accessories; section C, gold and silver mill machinery; section D, Huntington mills and crusher rolls; section E, frue vanner; section F, concen-

trating machinery; section H., hoisting cages and landing dogs; section J., rapid cyanide filter; section K., Chile mills; section I., Kennedy gyratory crusher. Compared with the corresponding period last year, spelter shows a decrease of 7,409 tons in imports and an increase of

Sulphur imports for seven months this year amounted to only 17,299 tons.

### Communications.

This department has been created for the exchange of ideas bearing on all branches of the mining and metallurgical industries. The Mining World will not be responsible for the statements made nor opinions expressed by correspondents.

#### MONTANA MINE OWNERS' ASSOCIATION.

The Editor:

At the time of the organization of the association the conditions surrounding the new smelter located at Ponderay, near Sandpoint, Idaho, seemed propitious for the association assuming its control and management and its officers and executive committee energetically entered upon the accomplishment of this plan.

While the purpose of carrying out this plan was not fully realized, a contract was entered into by the association and the Idaho Smelting & Refining Co., under the terms of which the ores of members of the association were to be treated at exceptionally favorable rates, as to low smelting charges and deductions and penalties.

Recently Thomas L. Greenough, vice-president of the association, and others, secured a controlling interest in the smelter, and one furnace is now in operation and the second stack will be completed and blown in within 30 days, there being several thousand tons of ore in the bins to supplement the large daily output of the Greenough mines. This new organization has assumed the above contract with the association and its members may now avail themselves of its favorable terms.

The successful carrying out of these plans has caused the "trust smelters" to reduce their charges over 30%, but this reduction does not, by a large percentage, meet the advantages available to the members of the association by shipping their ores to Ponderay.

The iniquitous method employed in the classification of railroad lands through the mineral belts of Montana were made so manifest at the meeting of the association that a committee, composed of Dr. O. M. Lanstrum, Jno. A. Rowand and Fred Whiteside, was authorized to proceed to Washington and present the matter to the President and the Interior Department. The committee went to Washington immediately and won a signal victory, resulting in the suspension of the issue of all patents to the Northern Pacific railroad until the matter can be investigated and a remedy applied, in the furtherance of which the committee is still engaged. This matter is of the greatest importance to every one engaged in the mining industry of Montana and Idaho, and the decisive action taken by the government was an acknowledgement of the influence a body of men can have when acting as a unit.

The matter of the inequitable rates charged by railroads for the transportation of ore was presented, in form of charges, by the association before the Montana state board of railroad commissioners. The hearing lasted four days, the association being ably represented by Attorney T. J. Walsh of Helena, who generously volunteered his services. The

matter is still pending before the board and there can hardly be a question that the result will be readjustment of rates upon a more equitable basis.

Thus far the work of the association has proved of incalculable advantage to the mine owners and operators of Montana and is a guarantee that greater good can be accomplished if all in interest lend their aid to the efforts of the officers, none of whom is now receiving any compensation for his services.

Legislation is needed and can be had upon the demand of the association, to properly protect the rights of mine owners and operators against unjust and unlawful encroachment of other interests of far less value to the development of the state.

Immediate steps should be taken to gather proofs and present to the proper chief officials and President, if necessary, the gross tyranny practiced by the petty officers of the United States land office and the forestry service in their dealings with mine owners and mineral claimants whom they seem to treat as trespassers upon the public domain when the spirit of the law intends that they should be considered the sturdiest friends of the public weal and the most important factors in the development of the country's wealth.

To carry on the good work, so auspiciously begun, requires the sinews of war—money. As stated, the officers are giving their services without pay, but there are always accumulating incidental expenses that must be met and every one engaged in the extraction and shipment of ore should, at least, become an active member of the association—it is a mere matter of money interest so to do, as more than the membership fee will be saved in a single shipment of ore.

R. A. BELL, Treasurer,  
Montana Mine Owners' Association.

### New Inventions Patented.

Specifications for the following United States patents relating to mining and metallurgy and allied subjects can be had by sending 20 cents with the title, number, and date of patent to The Mining World. Remittances may be made by coin, stamps or postoffice money order.

#### WEEK SEPT. 8, 1908.

Air Lock for Mines and Tunnels. P. H. Durack, El Paso, Tex. (898,343; filed Jan. 12, 1908.)

Levering Device for Crushing Rolls. W. H. L. Fielding, New Orleans, La. (898,349; filed May 16, 1908.)

Air Compressor. F. W. Parsons, Tarrytown, N. Y., assignor to the Ingersoll-Rand Co., New York city. (898,385; filed Jan. 7, 1905.)

Conveyor. W. M. Helms, Huntington, Ind. (898,408; filed Jan. 22, 1908.)

Recuperative Splitter Furnace. Nicholas L. Helms, La Salle, Ill. (898,409; filed July 28, 1907.)

Stamp Mill. W. A. Merrals, San Francisco, Cal. (898,414; filed Jan. 14, 1908.)

Metallurgical Apparatus. W. A. Merrals, San Francisco, Cal. (898,415; filed Dec. 18, 1906.)

#### WEEK, SEPT. 15, 1908.

Bag House. Holland E. Benedict, Salt Lake City, Utah, assignor to United States Smelting, Refining & Mining Co., Salt Lake City, Utah, a corporation of Maine. (898,426; filed Oct. 5, 1907.)

Horizontal Regenerative Coke Oven, etc. Francis J. Collin, Dortmund, Germany. (898,425; filed Mar. 21, 1907.)

### New Publications.

Publishers are invited to send all books and pamphlets, treating of subjects relating to mining, metallurgy, chemistry and kindred industries, to the Review Editor of The Mining World. Wherever possible state selling price of publications.

*Moody's Manual of Railroad and Corporation Securities. Ninth Annual Number, 1908.* Edited by Louis W. Holschuh. New York: Moody Manual Co. Pp. 2852. Price, \$10.

The task of compiling such a valuable book as Moody's Manual is monumental, and it is a credit to the publishers that the ninth annual number for 1908 excels in many respects its predecessors. In nearly 3,000 pages this year the editor gives a most complete description of all railroad, traction, electric, industrial, mining and other corporations in which the investor can have any possible interest. A few of the special features are: Earnings of many corporations for fiscal year ending June 30, 1908; comparative monthly statements of railroad earnings; one combined alphabetical index on colored paper; special indexing of railroad systems; and enlarged industrial section containing description of many important companies not found in any other manual.

*Compressed Air Plant for Mines.* By Robert Peele. New York, 1908; John Wiley & Sons. London: Chapman & Hall, Ltd. Pp. 325; illus. Price, \$3.

The subject of compressed air and its industrial applications, including the operation of rock drills, is carefully treated by Prof. Peele, both from the academic and practical viewpoint. The book has been brought up to date by an intelligent sifting of the articles that have appeared in the technical press, particularly with regard to the more recent applications of compressed air in mining. In the first part of his instructive treatise, the author discusses in detail the production of compressed air, and in the second part summarizes the progress that has been made in the transmission and use of compressed air. In order that the reader may draw a fair conclusion as to the adaptability of compressed air to any particular use, data are given which explain the advantages and disadvantages, in pumping, rock drilling, haulage, etc. In short, mine owners generally ought to read this book for it covers an important field—economic power. Engineers who may be in possession of other books on compressed air should also have a copy of Prof. Peele's, if for no other reason than it contains descriptions of the more modern installations.

Platinum to the quantity of 18,276 oz., valued at \$516,947, was imported into the United States in the seven months ending with July.

Graphite weighing 5,255 tons, valued at \$330,473, was imported into the United States in seven months this year.

Some smelting works prepare the fine lead-zinc sulphides for the blast furnaces by briquetting processes.

# Current Literature on Mining, Metallurgy, Etc.

*Explosives and the Building of Explosives Works.* Oscar Guttman. Describes the construction of a ferro-concrete explosives building, and its advantages.—Jl. Soc. Chem. Ind., July 15, 1908; pp. 334; illus. 75 cents.

*An Improved Hydraulic Air Compressor System.* George C. McFarlane. The inventor describes the advantages of his system of compressing air, and gives details of construction.—The Mining World, Sept. 19, 1908; p. 1; illus.

*New Method of Obtaining Sulphate of Ammonia.* R. S. Moss. Describes the Koppers system.—The Mining World, Sept. 19, 1908; pp. 2; illus.

*The Shape of the Iron Blast Furnace.* Henry M. Howe. Refers to the factors which have determined the dimensions of the stack in the past and are likely to govern changes in the future.—E. & M. J., Sept. 12, 1908; pp. 4½; illus. 20 cents.

*The Richards' Modern Pulator Classifier and Fig.* Detailed description of machines that are free from the imperfections which handicap the economic operation of certain others intended for the same work.—The Mining World, Sept. 19, 1908; pp. 4; illus.

*Costs of Mining Quartz Pyrite Gold Deposits.* James Ralph Finlay. In his study of the costs of mining and milling, the writer describes the practice at the gold mines on Douglas island, Alaska, the Homestake in South Dakota, Camp Bird and Liberty Bell in Colorado, El Oro and Esperanza in Mexico, and the mines in the Kolar district, Mysore, India.—E. & M. J., Sept. 12, 1908; pp. 6½; 20 cents.

*The Cobalt Silver District, Ontario.* William B. Phillips. Gives figures of production, and outlines the future of the district.—E. & M. J., Sept. 12, 1908; 300 words. 20 cents.

*Methods of Obtaining Chemical Solutions of Materials.* Evans W. Burskett. Brief outline of the most approved methods of reducing various materials to solutions for the purpose of analysis or examination.—Mg. Sci., Sept. 10, 1908; pp. 2. 20 cents.

*The White Cliffs Opal Field, New South Wales.* John Plummer. Describes the peculiar geological structure of the opal field and the method of prospecting.—The Mining World, Sept. 19, 1908; pp. 11-16; illus.

*The Various Mining Districts of Colorado.* G. W. Miller. In his fifth article the writer describes the Leadville district.—Mg. Sci., Sept. 10, 1908; pp. 2; illus. 20 cents.

*Tailings Elevators on the Rand.* Eustace Moriarty Weston. For many years, despite its high capital cost, the tailings wheel has reigned almost supreme on the Rand for raising water, sands and slimes from the foot of battery plants to the collecting vats of the cyanide plant

Articles mentioned will be supplied to subscribers at a discount of 5 cents per copy. Orders sent in two months after publication of desired article on this page will be charged 5 cents extra per copy.

In ordering, give date of The Mining World in which the article has been mentioned. All orders are payable in advance.

and spitzluten. Its supremacy has now been challenged on the score of high capital cost. A 30 or 40-ft. diameter wheel costs about \$8,000 to install. The writer describes the use of some other devices for lifting tailings.—E. & M. J., Sept. 12, 1908; pp. 1; illus. 20 cents.

*A Selective Electric Fuse Spitting Device.* Robert N. Bell. The device described was perfected at the Hecla mine in the Coeur d'Alene district, Idaho.—E. & M. J., Sept. 12, 1908; pp. 2; illus. 20 cents.

*The Independent Power Co.* Evans W. Burskett. Describes the manufacture of dynamite.—The Mining World, Sept. 19, 1908; pp. 2½; illus.

*The Operation of Coal Cutting Machinery.* George E. Lynch. This is a technical discussion of the use and economy of the various coal cutters showing the advantages and disadvantages of each type.—E. & M. J., Sept. 12, 1908; pp. 21-6; illus. 20 cents.

*Letters of a Miner to His Farmer Brother.* Matt W. Alderson. This is the first article of an interesting series; it emphasizes the importance of a knowledge of the details of mining as an aid to success.—The Mining World, Sept. 19, 1908; pp. 11-6.

*The Nevada-British Mining Co., Ltd.* Will C. Higgins. The property described is located two miles north of Cherry Creek, White Pine county, Nevada.—Salt Lake Mg. Rev., Sept. 15, 1908; pp. 2½; illus. 25 cents.

*The Nevada-Mother Lode Mining Co.* Will C. Higgins. Description of the geology and development of the ore deposits of this company. The property is near the head of Silver canyon in the Cherry Creek district, Nevada.—Salt Lake Mg. Rev., Sept. 15, 1908; pp. 2; illus. 25 cents.

*The Japanese Volcano Aso and Its Large Caldera.* Robert Anderson. Aso-san is a volcano in the center of Kiushiu, Japan. It consists of a huge mound-shaped cone on the summit of which is sunk an oval bowl measuring about 10 miles in width, 14 miles in length, and 1,000 to 2,000 ft. in depth, the bottom being some 1,500 ft. above sea level. Within this short bowl a range of mountains, attaining an altitude above sea of 5,500 ft. and overtopping the rim more

than 2,000 ft., runs from east to west across its short diameter and divides it into two crescent-shaped basins. The writer describes the history and geology of the volcano and the country that surrounds it.—Jl. of Geol., Sept.-Oct., 1908; pp. 28; illus. 80 cents.

*Liquid Fuel.* Charles L. Hubbard. Describes the advantages and disadvantages of liquid fuel as compared with coal; heating value of oil; oil burners; and temperature, pressure and inflammability of oil.—Power, Sept. 8, 1908; pp. 11-6. 20 cents.

*Pachuca and Real del Monte Silver District.* Claude T. Rice. The mining and milling methods are being rapidly modernized, says the writer. Describes also the geology of the district.—E. & M. J., Sept. 12, 1908; pp. 7; illus. 20 cents.

*Short Talks on Mining Lane.* A. H. Ricketts. In his tenth article the writer discusses titles.—E. & M. J., Sept. 12, 1908; pp. 11-6. 20 cents.

*Dredging in the Yukon.* T. A. Rickard. Continuation of a previous article.—M. & S. P., Sept. 12, 1908; pp. 4; illus. 20 cents.

*Method of Lacing Belts.* W. A. Walling. Gives sketch showing how to lace belts so that they will stay intact for years.—Power, Sept. 8, 1908; 20 cents.

*Dry Placers of Northern Sonora.* F. J. H. Merrill. Describes the methods employed to win the precious metals.—M. & S. P., Sept. 12, 1908; pp. 1½; illus. 20 cents.

*The Mammoth Smelter at Kennett, California.* Al. H. Martin. Description of the equipment and smelting methods in vogue at the largest active plant in California.—Mg. Sci., Sept. 10, 1908; pp. 2; illus. 20 cents.

*A Peruvian Lead Smelter.* Lester W. Strauss. Describes the only lead smelter in Peru that ships argentiferous lead bars. The smelter is at Vesubio, in the department of Ancachs. The ores treated are a mixture of galena, zinc blende, pyrite, chalcocite, and tetrahedrite, in a quartz gangue.—M. & S. P., Sept. 12, 1908; pp. 2½; illus. 20 cents.

*Relation of Wind to Topography of Coastal Drift Sands.* Pehr Olsson-Seifer. As a geological agent the wind exercises a considerable modifying power, although its character is very unsteady. It manifests its influence by carrying fine particles of soil, depositing these, denuding rocks that stand in its way, and indirectly affecting the topography of the earth's surface by distributing moisture and limiting vegetation. The moving sands of sea shores afford ample opportunity for study of the methods of the wind in its work of denudation. The writer describes a series of observations that have been made by him.—Jl. of Geol., Sept.-Oct., 1908; pp. 16; illus. 80 cents.



## Progress in the Manufacturing Industries.

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made, and illustrated descriptions of new inventions or improvements.

### S. & S. Variable Speed Countershaft.

The accompanying illustration shows an ingenious device which is being manufactured by the Rotary File & Machine Co., 589 Kent avenue, Brooklyn, N. Y.

Every manufacturer knows there is a leakage in profits through his inability to run his machines at just the limit speed suitable for the job on hand, but unlike a leaky joint in a steampipe, it does not constantly remind him of its existence. The makers confidently assert that this wastage in many instances easily approximates 25% of the yearly profit.

The S. & S. variable speed countershaft consists of an arrangement of expanding belt operating pulleys by means of which any variable speed relationship desired within the limits of 1-1 can be maintained



S. S. Variable-Speed Countershaft.

at its maximum and capable of ready adjustment at a moment's notice.

The gear is made in 14 standard sizes, capable of transmitting up to 128 hp. The variation in the diameter of the expansion pulley is effected in the following way: It will be noticed that the rim is divided into 12 sections with two spokes riveted to each. These spokes slide in machined slots inside a cast iron hub. Part of each spoke inside the boss has teeth milled on one edge and all are in mesh with a broad pinion. This pinion is operated by an inner shaft which is only capable of longitudinal movement, but owing to grooves being milled on the one end of this inner shaft, any movement given to same rotates the aforesaid pinion inside the hub. This draws the spokes in or forces them out according to the direction of motion given to the hand wheel which operates both of these inner shafts simultaneously.

The manufacturers claim their ability to transmit any amount of power and vary the speed at a ratio of approximately 1-1 with little more waste than would be found in two ordinary shafts running together in parallel.

Zinc ore imports for the seven months ending with July were 26,340 tons, as against 6,279 tons last year.

### Trade Publications.

**Air Compressors.** Chicago Pneumatic Tool Co., Chicago. Catalog No. 26. Pp. 27; illustrated.

In this catalog is shown the various styles of Franklin air compressors, both steam driven and geared to electric motors. Tables of general specifications and dimensions are given for each style.

**Mining Machinery.** Power & Mining Machinery Co., Cudahy, Wis. Bulletin Nos. 27 and 28; pp. 16 and 20; illustrated.

These bulletins describe respectively Huntington improved mills and Superior rolls. Besides the half-tone illustrations, there are drawings showing the general dimensions of the machines. The improvements made on the Huntington mill are described in detail.

**Huntington Mills.** Allis-Chalmers Co., Milwaukee, Wis. Bulletin 1431; illustrated.

This bulletin is of value to all operators of the Huntington mill for by consulting it trouble occasioned by mistakes in setting will be avoided and a careful observance of the precautions indicated, especially those in relation to topping and starting, will prevent trouble in the operation.

**Crushing Machinery.** Geo. V. Cresson Co., 90 West street, New York city. Catalog No. 5; illustrated.

Crushing machinery for mining and cement and stone-crushing plants is described. Numerous photographic views of the different machines are presented, and attention is called to the fact that the company's equipments are all made to standard gage and all parts are interchangeable. Every machine built is fully assembled and, whenever practical, tested before leaving the works.

**Melting Furnaces.** Rockwell Furnace Co., New York City. Pp. 34; illustrated.

It is devoted to melting furnaces for melting all metals, tinning, galvanizing, hot hardening and all operations requiring molten metal or other heated baths. Illustrations and brief descriptions of the numerous types of furnaces are given, together with tables of specifications. Special tiles, oil storage tanks, ladle heaters, oil burners, fuel oil pumping system, pressure blowers, etc., are also included.

**Flexible Brass Joints.** Barco Brass & Joint Co., Milwaukee, Wis. Catalog No. 16. Pp. 16; illustrated.

Describes the Barco flexible joint, which is adaptable for use between sections of pipe wherever flexible conveyors are required for steam, compressed air, gas or liquids. The joint is made in three parts and has two non-metallic gaskets which prevent the contact of metal to metal at any point. A liquid joint, particularly for conveying oil or liquids, is also shown, and several applications of both joints are illustrated.

### Industrial Notes.

The Denver office of the Jeffrey Mfg. Co. of Columbus, O., has been moved from 1710 Glenarm street to 1711 Tremont place.

The Denver Rock Drill & Machinery Co., Denver, Colo., has opened a district office at 211 Dooley block, Salt Lake, Utah, with John C. Taylor in charge.

The Union Hydraulic Pipe & Boiler Works, Juneau, Alaska, has received orders for the manufacture of ore cars, skips, and other heavy machinery for use in Alaska mines.

Chas. A. Schieren Co., New York city, is sending out an attractive wall ornament which also possesses utility, consisting of an illustrated card upon which are mounted a thermometer and a barometer, together with an advertisement of "Dux-bak" heating.

The new warehouse of the Utah Mining Machinery & Supply Co., Salt Lake, Utah, is to be of structural steel and reinforced concrete, 42 by 160 ft., two stories and basement. The American Bridge Co. is erecting the structural steel and the company itself is doing the concrete construction work.

The Industrial Power Co., Milwaukee, Wis., manufacturers of the Atkinson automatic gas producers, has been sold to the Industrial Gas Power Co., with offices at 621-622 Casswell block, Milwaukee, Wis. The officers of the new company are W. O. Jones, president and treasurer; C. J. Atkinson, vice-president, and H. K. Cowen, assistant treasurer and secretary. The new company will continue to manufacture the Atkinson gas producers, of which there are a large number in successful operation at the present time.

The Deister Concentrator Co., Fort Wayne, Ind., advises that it has received an order for five Deister tables from the Coniagias mines, Cobalt, Canada; eight from the Cia. Minera Cuchara y Anexas, Toluca, Mexico; four from the Granby Mining & Smelting Co., Joplin, Mo., and one from the Buffalo Mines Co., Cobalt, Canada. The Coniagias Co. has Deister tables in its mill at present, the addition of 30 stamps, however, necessitating the installation of five more tables. The Buffalo mill is using five Deister tables at present and an additional table has been ordered.

Announcement is made by the National Battery Co. of Buffalo that the receivership under which that company has been operating since last February was terminated August 19. All claims against the National Battery Co. have been settled and the entire property has been restored to the stockholders. It is also stated that full control of the reorganized company has been secured by the Cutler-Hammer Mfg. Co. of Milwaukee, makers of battery charging rheostats and other electric controlling devices. The plant of the National Battery Co. will remain at Buffalo, but the business will be conducted under new management and with ample capital.

## Personal.

D. C. Jackling of Salt Lake, Utah, is in Montana.

John Hays Hammond was in Cobalt, Ont., recently.

W. D. Pearce of Chihuahua, Mex., has been making mine examinations in the state of Nevada.

J. W. Ball has resigned as manager of the Imperial Mining Co.'s property in Beaver county, Utah.

D. W. Shanks, general manager of the Rio Plata Mining Co., Chihuahua, Mexico, is in New York city.

W. J. Metts has assumed charge of the property of the Brazilian-Monitor Mining Co., at Silverton, Colo.

J. C. Haas, mining engineer, Spokane, Wash., was in Greenwood, B. C., last week on professional business.

S. H. Rabbit, superintendent of the Highland Mary mine, Pioche, Nev., was a recent visitor in Salt Lake, Utah.

A. E. Place of Place & Elton, mining engineers, has returned to Oaxaca, Mex., from a business trip to Boston, Mass.

W. C. Greene has returned to Cananea, Mex., from the Orient. He is not yet fully recovered from his recent illness.

W. S. Mann, general manager of the Boston & Oaxaca Mining Co., Tlaolula, Oaxaca, Mexico, is in Boston on company business.

W. G. McBride has resumed his duties as superintendent of the Sierra de Colbre mine in the Cananea district, Sonora, Mexico.

Lafayette Hanchett, general manager of the Newhouse interests in Utah, has resumed his duties after a several weeks vacation trip.

H. N. Timolat of Chicago, president of the Bullion King Mining Co., is making an extended visit to the mines of the company at Silverton, Colo.

C. K. Thomas, sales manager for the D. T. Williams Valve Co., Cincinnati, O., was in Chicago this week on his way east from an extended western trip.

Dr. James Douglas has returned from his visit to European points and is now at the properties of the Phelps-Dodge interests, of which he is managing director.

Todd C. Woodworth has been appointed general manager and E. W. McLean superintendent of the Mary Mining Co., with properties at Arichuyro, Chihuahua, Mexico.

Ross E. Matkins has been appointed general manager of the Hinds Cons. Mining Co., with properties near Santa Barbara, Chihuahua, Mexico, succeeding W. W. Elmer, resigned.

M. D. Murray has been appointed superintendent of the Rio Tinto copper mines, at Terrazas, Chihuahua, Mex., recently taken over by Corrigan, McKinney & Co., of Cleveland, O.

H. Koppers, inventor of the by-product coke ovens, bearing his name, and which were recently installed at the Illinois

Steel Co.'s plant at Joliet, Ill., inspected that plant last week.

E. A. McFarland has resigned as chief engineer of the Southern Pacific lines in his mining interests in Sonora, Mexico. Mexico and will devote his entire time to He will be succeeded by R. L. Diane.

E. E. Ellis, formerly assistant geologist of the Oliver Iron Mining Co., has assumed the duties of geologist for the Tennessee Coal, Iron & Railroad Co., with headquarters at Birmingham, Ala.

Benedict Crowell of Crowell & Murray, Perry-Payne building, Cleveland, O., who returned recently from an examination of gold properties in Arizona, is now making an extensive examination of copper properties in Ontario.

John Laurie, comptroller of the United States Smelting & Refining Co., was compelled to return to his home in Boston from Mexico on account of serious illness. He was on a tour of inspection of the company's holdings in the southwest.

Oscar E. Thaleg has been appointed assistant to L. J. Hewes, Chicago manager for the Power & Mining Machinery Co. Mr. Thaleg is a well-known mechanical engineer of ability and has been connected with the American Hoist & Derrick Co., Atlas-Chalmers Co. and Lake Shore Engine Works. He is a graduate of Purdue University.

## Obituary.

Charles K. Lord, president of the Tonopah & Goldfield railroad, died in Philadelphia, Sept. 19, from Bright's disease. He was born in Hoosick Falls, N. Y., in 1848.

Orrin Caldwell, chief clerk for the Minas Tecolotes y Anexas, at Santa Barbara, Chihuahua, Mexico, died at that place on Sept. 9, from Bright's disease. The remains were taken to Pocatello, Idaho, for burial.

Cabell Whitehead, M. Am. Inst. M. E., at one time assayer of the United States mint in Washington, D. C., died of pneumonia at Nome, Alaska, Sept. 7. Dr. Whitehead was born at Lynchburg, Va., in 1863 and graduated at Lehigh University in 1885.

Gardner D. Hiscox, an author of scientific and technical books, died at his home in East Orange, N. J., Sept. 13. He was born in Elizabethtown, N. Y., in 1822. In 1860-61 he acted as engineer for the Ingersoll Rock Drill Co., now the Ingersoll-Rand Co. Among his best known books are "Compressed Air and Its Application," "Modern Steam Engineering" and "Hydraulic Machinery."

The manganese ores of Tennessee are the southward continuation of the Appalachian valley deposits of Virginia. As in Virginia, they occur near the eastern border of the valley. The best known of the Tennessee deposits occur in the vicinity of Newport and De Rio, Cocke county, and in Shady Valley, Johnson county.

## Technical Schools and Societies.

**Cyanide Technical Club.**—A movement is on foot in Guanajuato, Mex., to form a "Cyanide Technical Club" to hold regular meetings, where papers on the problems involved in the mechanics of plant construction and on the chemical science of cyanidation may be read and discussed. It is proposed that proprietors, managers and superintendents of plants, with chemists engaged in cyaniding, may become members, and that each contribute a paper on plant construction or the technique of practice, within a year.

**American Society of Mechanical Engineers.**—The season of professional meetings of the society will be opened on Tuesday evening, Oct. 13, by a meeting of the gas power section in the Engineering Societies building at 20 West 39th street, New York city. H. L. Doherty, chairman of the meetings committee of the section, will present a report for discussion outlining plans for future work and there will also be a discussion of standards to be used in gas power work. Two papers will be read, one by E. A. Harvey on gas producer plants, with data upon costs, performance, etc.; and one by N. T. Harrington giving the results of tests to determine the loss of fuel weight in a freshly charged producer, due to increase of ash content in the fuel bed. The first paper will be illustrated by lantern slides, showing actual plants and plans for the arrangement of apparatus.

## Coke Industry in Montana.

The production of coke in Montana in 1907 amounted to 40,174 short tons, valued at \$295,174, according to the United States Geological Survey. Compared with the production of 1906, which amounted to 38,182 tons, valued at \$266,024, this is an increase of 2,523 tons, or approximately 0.67%, in quantity, and of \$29,150, or more than 10%, in value.

The average price per ton advanced from \$6.97 in 1906 to \$7.25 in 1907. One new establishment was added to the coke manufacturing plants of the state in 1907, increasing the number from four to five.

The new establishment was not, however, entirely completed before the close of the year and reported no production, and two of the other plants, with a total of 100 ovens, were also idle throughout the year.

The percentage yield of coal in coke during 1906 and 1907 was 55.3% in the earlier and 59% in the later year.

The higher yield in 1907 as compared with 1906 indicates a better separation of the impurities by washing. Less coal was used in 1907 than in 1904 (68,948 tons as compared with 78,303 tons), while the production of coke was greater. All of the coal used for coke making in Montana is run-of-mine, and nearly all of it is washed before charging into the ovens.

Iron and copper pyrites to the amount of 547,976 tons, containing about 257,598 tons of sulphur, were imported into Great Britain during the eight months ending with August.

# Late News From The World's Mining Camps.

By STAFF CORRESPONDENTS.

## ARIZONA.

### Prescott.

The Tip Top Heath Mining Co., under the management of Frank Wagner, has recently finished a wagon road from the mine to the Prescott and Phoenix Black Canyon stage road, a few miles south of Goldland. The property is near the southern part of Yavapai county. Mr. Wagner expects to soon have the company financed to carry on extensive operations on the Tip Top mine. The property was once a producer of silver. It is developed to a depth of 600 ft. and some large bodies of ore are now blocked out.

C. E. Bunker has been appointed receiver for the Monica Mines Co. whose property, the Monica mine, is 16 miles southeast of Kirkland on Weaver mountain. The property, consisting of 21 locations, is opened to a depth of 1,000 ft. by a crosscut tunnel and ore is blocked out by drifts and raises. On the property is a modern 20-stamp mill, a concentrating and cyanide plant. The proceedings were brought by the assignee of T. M. Earnhart, E. B. Cortrell, E. E. Beebe and F. E. Howe, original holders of a first mortgage in the amount of \$25,800. T. M. Earnhart, on another account, has attached the company's properties in the amount of \$25,600. The entire obligations of the company are said to be less than \$70,000. Mr. Bunker will at once take full charge of the company's affairs and arrange for an early resumption of operations.

J. Kearney Rice, trustee of the Arizona Smelting Co. and of the Cons. Arizona Smelting Co., an associate concern, has petitioned the referee in bankruptcy of the United States District Court of New Jersey for an order authorizing the private sale of the properties of these two companies in this county free of all liens except two mortgages. The properties to be sold include the Humboldt smelters and patented lands, the Blue Bell group of mines near Mayer, 1,000 shares of the stock of the Arizona Exploration Co., a claim against 2,878 shares of the DeSoto Mining Co. and 279 11-24 shares of the capital stock of the DeSoto Mining Co.

John Mariner of Virginia has purchased the Oldlong mine, four miles east from here, from J. C. Engle. The consideration has not been made public. The vein has been opened by two 35-ft. shafts and one 58-ft. shaft and large bodies of copper and gold-bearing quartz are exposed. Several shipments of the ore to the Humboldt smelters gave good returns.

### Bisbee.

The General Grant mine in the Ellisworth district, Cochise county, has been sold to John S. Wright, of St. Louis, William Wilson and Geo. N. Glower being the sellers. The Grant claim, on which 150 ft. of development work has shown a large deposit of high-grade gold

ore, comprises 20 acres. Mr. Wright plans to put a force of men at work at once to take out ore, which will be shipped to the El Paso smelter.

### Globe.

The marked improvement in the Old Dominion Co.'s mine and the increased output of copper by that company, the development by the Miami Copper Co. of an immense deposit of low-grade sulphide, the opening of a very large and high-grade ore body by the Warrior Copper Co. and the important developments on the Black Hawk fault by the Superior & Boston and Arizona Commercial Copper companies, explain the expansion of mining in this district.

Two large mining interests are negotiating for an option on the Inspiration mine, and one of them has had experts at the property for two weeks sampling and assaying the ore. The Inspiration is one of the large copper properties of this district, the control of which is held in Kansas City, Mo., and Leavenworth, Kas. It is held at \$1,500,000. J. D. Coplen is general manager. The property adjoins the Miami Copper Co.'s holdings and is opened to the depth of 350 ft. It is claimed that there is developed 1,500,000 tons of chalcocite ore averaging about 3% copper, and an equal amount of oxidized ore going from 3 to 4% copper.

The 570 level of the Miami Copper Co.'s property is now being opened and the crosscut and drifts are in ore carrying 2½% copper. At a distance of 2,150 ft. west of the Red Rock workings the Miami Co. is sinking another prospect shaft and at the depth of 270 ft. it has gone through an oxidized material with carbonate of copper through it. Work has been started on a square 4-compartment working shaft, the first of the kind sunk in this district. The company is waiting on the extension of the railroad from Globe to its property to begin the construction of the first 1,000-ton unit of a concentrator and, because of the greatly increased tonnage of ore developed, the management has decided to erect the second unit immediately following the completion of the first.

The General Development Co. has taken over the Newman option on the Keystone group, adjacent to the Miami mine, and has started development work. Churn drills will be used to prospect the ground to the depth of 600 ft. The Keystone has produced several hundred thousand dollars from a vein of silicate ore near the surface.

The Eureka copper group of eight claims, surrounded by the holdings of the Miami, Inspiration and Keystone companies and the Berray & Hinn group, is a well-situated and promising property. A large deposit of silicious ore from surface workings returned \$300,000 gross. A strong vein of 8% ore has been opened to the depth of 150 ft. It is probable that

a company will be incorporated to develop the property.

The Orphan Copper Co. is developing a group of claims that lies southeast of the Keystone. A prospect shaft is down 150 ft. A steam hoist and air compressor have been installed and the shaft will be sunk to a depth of 500 ft. before much lateral work is undertaken. Some good ore has been mined from shallow workings, and stringers of high-grade sulphide were recently encountered in the shaft.

### Jerome.

The discovery of a small body of high-grade ore is reported to have been made in the drift from the main shaft on the property of the Arkansas & Arizona Co.

Preparations are being made for the delivery of ore from the Cleopatra mine to the company's smelter, which is ready for operation and is only awaiting ore. It is expected that it will be started up within 60 days.

Sulphide ores are still being encountered on the Mescal.

The drainage tunnel started on Dec. 23, 1906, by the United Verde Co., has been completed. The tunnel, which is 7 ft. by 7 ft. in the clear, has a length of 6,592 ft. and was completed in 20 months and 17 days. The first 500 ft. from the valley end was driven by hand. The tunnel will drain the mine above the 1,000 level. It will eventually be used as the main drainage tunnel.

### Kingman.

Gladdings and Awaues have discovered rich gold ore in the vicinity of the McCracken mine, and are making arrangements to start operations on their new discovery.

## CALIFORNIA.

### Los Angeles.

The Pacific Machinery Co. of Los Angeles has contracted with Hasson Bros. to erect a 5-stamp mill at Daggett, San Bernardino county. The Hasson Bros.' property is known as that of Ord Mountain Gold Mining Co., and is about 14 miles south of Daggett. The shaft is down 250 ft. and at 237 ft. a flow of water was struck, which will prove to be of great value. Drifts have been run on the 100 and 200 levels and in the drift on the 100 level, 12 ft. of ore was encountered which averaged better than \$100 to the ton in gold. In the west drift is a 3-ft. cross fissure of good ore. Ord mountain is traversed by a great many parallel dikes in which ore shoots and bodies occur.

Shipments of high-grade ore to Salt Lake have been begun from the Lucy Gray property three miles north of Lyons. The property was located three years ago and development has been steadily prosecuted for two years and, with 1,100 ft. of underground work accomplished, enough milling ore is in sight to warrant the erection of a mill and the company is considering installation of a 10-stamp Nissen

plant. The management has placed an order for pipe to convey water from a spring three miles away. On the property is a 16-hp gasoline hoist and the main shaft is down over 200 ft. The 100 level has a 190-ft drift south, 150 ft. being in good milling ore. At the end of the 150 ft. is a streak of ore averaging 150 to the ton.

John Alexander of San Quentin has been ordered of the Pacific Machinery Co. of Los Angeles 2,000 ft. of 10-in. pipe, and a pump to be used in sluice mining.

The International Mines Co., a holding company, lately formed at Los Angeles with a capitalization of \$1,000,000, has taken over the property of the Gold Leaf Mining Co. in Shasta county, and the American Girl mine 115 miles from Yuma, Ariz. The Gold Leaf Co. owns the Gold Leaf and White Oak properties, the former of which has been fully developed and is now equipped to maintain steady shipments of gold ore. The White Oak has not yet been developed to the same degree. The American Girl is said to have no less than 1,000,000 tons of gold and copper ore in sight and has been equipped with a 100-ton reduction plant. This will be overhauled at once and operations commenced on a large scale. Offices of the new company will be maintained in Los Angeles and in New York city.

Seven miles from Kelso on the Salt Lake railroad is the property of the Lucille Gold & Copper Co. The crosscut tunnel has been in ore for over 50 ft. and sample assays give values of \$21.20 to the ton in gold. The lower tunnel just started will tap the ledge 450 ft. beneath the surface.

#### Amador City.

Owing to the scarcity of water and the low grade of the ore, operations at the Gwin mine have been suspended for an indefinite period. The Gwin has yielded much gold. During the past 15 years it has been worked under bond by Charles Belshaw, F. F. Thomas, David McClure, E. C. Voorhies and associates with varying success.

At the Kennedy extensive developments are going on in the lower workings and the mill is running at full capacity on excellent ore. The employment of crude oil for power purposes, and other improvements recently installed at the mine, are contributing materially to an economical production of ore.

At the Argonaut considerable exploration and development work is under way below the 2,000 level. The mill is running on a fair grade of ore.

W. Doyle and Matt Thomas have taken a lease on a block of ground on Amador Queen No. 2 and are driving an adit from the Doyle mine to cut the rich pockets ore in the property. They have already encountered and extracted considerable rich ore.

Crocker, Stowers and Hambric are working a lease on the Amador Queen extension and are extracting high-grade ore.

At several other points in this section luses are working with excellent results. The veins are small, with the ore usually occurring in pockets, although a

good portion of the ledges carry milling values.

A ledge of milling ore has been encountered on the 200 level of the Mitchell mine. Owing to the water shortage the mill is idle and it will be impossible to operate it until the fall rains set in.

It is reported that a company is endeavoring to secure a bond on the Alpine mine near Plymouth. The property has produced considerable ore.

The shaft at the Bay State has been unworried to the 400 level and is in good condition to this point. The pumps are working steadily to clear the shaft to the 1,000 level, after which active developments will be commenced. When last worked several good bodies of ore were blocked out in the lower workings and with the introduction of modern mining and metallurgical methods it is expected that the Bay State will again become a large producer.

It is reported that the eastern company which recently took over the Bell-wether mine will commence active work within two months.

#### Sacramento.

Rich gold strikes are reported on Rush creek, about 15 miles from Mono lake. The original find was made by a man named Miller, of Rawhide, Nev. The district is traversed with immense mineralized dikes and promises to develop into an important gold yielding section. Water is said to be plentiful. The camp numbers about 300 people, with fresh arrivals constantly coming in.

Dredging in the Folsom district is progressing steadily and large quantities of gravel are being handled by the dredges of the Folsom Development Co. and the Natoma Development Co. Several of the big Folsom dredges are working difficult ground on Rebel hill with excellent results. The Natoma dredges are handling approximately 280,000 cu. yd. per month, each.

#### Redding.

The Bank of Shasta county has instituted foreclosure proceedings against the Phoenix Security Co., operating in Shasta county. The action involves the Mt. Shasta gold mine at Shasta and several properties in the Bully hill district. The Phoenix Security Co. has for several years been prominent in the development of Shasta county mines.

The Grand Central Mining Co. has let several contracts for the driving of tunnels on its recently-acquired Harrison Gulch property and is otherwise arranging to work the mine on a large scale.

The Midas mine is worked with over 100 men and a large quantity of ore is being turned out. The concentrators recently purchased from the Bonanza King Co. have been placed in position and are working satisfactorily. The mill is running at full capacity.

The Lyon furnace at the Ilgroult electric iron smelter has been running for several weeks and turning out a superior quality of pig iron. The commercial plant is rapidly nearing completion and the production of pig iron on a large scale will commence at an early date. The wood hydropunt plant, for the manufacture of charcoal, turpentine and oth-

er products, is also practically completed. Surveys have been made for a 2,000-ft. gravity tramway from the iron mines to the smelter. Considerable iron ore has been blocked out in the iron mines along the Pit river and an abundance of ore is insured for immediate treatment.

#### Grass Valley.

Operations have been suspended at the Brunswick mine for an indefinite period and all underground machinery is being removed. It is stated that the mine has been worked at a loss for several months and that under existing conditions it is practically impossible to operate at a profit. The management recommended the sinking of a new shaft, but the company does not feel justified in incurring the additional expense at this time.

The North Star Mines Co. has purchased the Larimer quartz claim for \$26,000. The property adjoins the North Star holdings and contains seven water rights and a promising ledge. Extensive development work is being done below the 3,000 ft. level. Eighty stamps are dropping constantly.

The Oustomal mine at Nevada City and the Liberty, Grant, Dower and numerous other properties in God's Country have been bonded by A. M. Gilbert of Santa Barbara, who recently took over the Norambuena and Norandine mines at Grass Valley, the Lecompton at Nevada City and numerous other mines in Nevada county. It is understood that Mr. Gilbert has the bonding of two or three more mines under consideration.

A 7-in. vein of high-grade arsenical sulphide quartz has been struck in the Golden Rose mine near Alhambra. The mine was recently bonded by E. H. Wilson of Colorado for a small consideration. Several men have been put to work developing the vein.

## COLORADO.

#### Cripple Creek.

During the first 12 days of this month the shipments of ore from Cripple Creek district aggregated 28,000 tons. It is estimated that over 100 dumps are being overhauled, and the better product sorted out and sent to market.

A new plant has been installed on the Mitchell property near Cameron, which has been inactive for a long time. Development of some large low-grade ore deposits is now in progress.

A No. 7 Cameron pump has been purchased by the School Section Leasing Co., operating on block No. 8 of the Bull Hill school section. The mine is producing steadily, consignments being sent out three days in each week. The ore yields from 1 to 3 oz. gold per ton.

A new compressor with machine drills is to be placed on the Monte Cristo on the western slope of Beacon hill by the Julia V. Mining Co., owning the Henry Adney property.

The ore extracted from the Pointer is carrying as high as 50 oz. silver per ton, the gold values varying from 1 to 3 oz.

The directorate of the Maud S. Mining & Development Co. has decided to install machinery at the Maud S. shaft and to

continue sinking from the present depth of 75 ft. to 200 ft.

Morris and associates on the Mary Wynne claim on Gold hill are mining \$15 to \$25 ore at a depth of 55 ft. The wilderness now used is to be supplanted by a steam hoist.

Baker & Von Tilborg, leasing the Co-manche Plume, have installed an air-driven hoist in a station of their tunnel. The ore ships at 1 to 3 oz. The production is 50 tons per week.

The Arizona & Cripple Creek Leasing & Mining Co., a recent incorporation, has placed a powerful mining plant including an electrically driven 6-drill air compressor and 8-in. by 10-in. geared hoist at the Cummings shaft on the Colorado Boss on the southern slope of Gold hill. The property is owned by the Cripple Creek Cons. Co. and is in charge of J. P. Wilson of Denver.

The Ada Bell claim, owned by James McClurg and associates of Denver, is to be equipped with a complete mining plant. Recent discoveries made on the adjoining property by Baker & Tilborg have encouraged the owners of the Ada Bell to develop their property.

Balfour & Maginn, leasing on the North Burns of the Acacia, have opened at the surface a shoot 2½ ft. wide that assays from \$40 up to \$1,100 to the ton.

At the Wild Horse mill of the United Gold Mining Co. about 800 tons a month is being treated, netting \$3.50 per ton.

The Trilby mill is temporarily closed. Miller & Appleby, leasing on the Lone Jack on the southerly slope of Gold hill, will make a trial shipment this week.

#### Leadville

The Dinero tunnel at Sugar Loaf has, at 5,500 ft. from the portal, intersected what appears to be a part of the big Dinero vein. The manager will cut a station and install an electric power plant for drifting and upraising to the old shaft.

Future developments in the Dinero tunnel will be watched with interest. If they prove as successful as at present indicated a great deal of mining will be done there and much new machinery required, probably including some concentrating mills. John H. Harrison is the superintendent and Dudley M. Gray of Denver general manager. Many mining concerns holding property in that section that have been awaiting the outcome of the Dinero tunnel will now consider plans for resuming work.

The winze sunk from the tunnel level of the Huckleberry at St. Kevin has passed through a strong vein of high-grade ore and shipping will be started very soon. All of the ore runs over \$40 and up to \$150 per ton. An excellent plant of machinery has been erected.

Since the electrical equipment was installed at the Bald Mountain tunnel a few weeks ago, rapid progress has been made. It is probable that, when the objective point—the Sunday vein—is reached, an electric motor and other appliances will be installed. The tunnel will then be 1,500 ft. in length.

Arrangements are being made for the electrification of the new Berdella tunnel

in St. Kevin district. A power plant is now being built near the portal. As soon as the machinery is placed the tunnel will be driven as fast as possible to intersect the vein a short distance ahead.

A promising discovery has been made in the Manhattan property in Willis gulch. The tunnel recently passed through an ore streak 14 ft. wide, that is now being followed. Tests show it to be of good milling grade. As the locality is remote from a railway, the erection of a mill is being considered.

Lessees of the Big Six property on Breece hill have opened a good ore body. Some of the mineral is rich in gold and it is believed that they have struck a continuation of the ore shoots in the llex.

Arrangements are being made for the resumption of work on the Jenny June mine in East Tennessee. Denver and Leadville men are to do considerable work there this fall and next winter. A plant of machinery will be installed this month and a force of men put in the mine.

Charles Aichers, working the Mamme in South Mosquito gulch, has struck a 4-ft. body of ore resembling that in the London mine in Park county. Mr. Aichers is also working the Mohawk and other properties adjoining the Mamme. He has completed the installation of a machinery plant, which was moved from the Felipe mine on Breece hill.

#### Lake City

The Newport mine has been transferred to George H. Duke and Frank C. Goudy of Denver. There is a 7-ft. ore body, mostly shipping stuff, the remainder being excellent milling rock. Tests of the vein matter will be made in local plants and, if the property yields the values expected, it will be extensively developed and an up-to-date concentrator will be built.

#### Aspen

What appears to be the richest and most extensive strike ever made in the Independence gold belt occurred a few days ago on the property owned and developed by Abel Johnson and Victor Spindler. The mine is situated at a point one mile above the old Independence camp. Samples from a 6-ft. vein gave rich returns.

#### Georgetown

The strike of a few weeks ago in the Shively mine is improving with development. The drift has been run over 60 ft., exposing a streak of gray copper and ruby silver from 4 to 6 in. wide. Manager R. J. Martelon will shortly start work on the construction of a 25-ton mill.

An important strike occurred last week in the Mountain Quail. The hoist at the Burleigh mill was started up a few days ago. The building of more tramways is contemplated to convey ore from the Pelican workings.

It is reported that the Santiago mine in East Argentine will be sold to a syndicate of eastern men.

Frank Graham, manager of the Capital mines and mill, will, in the near future, carry out plans for building the second

unit of 100 tons capacity of the Capital mill.

A blind vein was opened a few days ago in the face of the Prudential tunnel on Republican mountain. The tunnel is in 650 ft. headed for the Magenta-Turner vein. With the installation of a machinery plant now in contemplation, the mountain will be thoroughly exploited and ore bodies opened.

A. H. Roller of Idaho Springs is in Utah, studying the large milling plants at Bingham canyon and in other parts of this state, gathering ideas for the large plant to be erected on the Alice mine in Yankee Hill district, Clear Creek county. The Alice ore is of very low grade.

The Merry Monarch Co., operating in Upper Fall River district, near the Alice, has purchased a compressor plant and gasoline engine, which are now being installed.

#### Central City

R. I. Hughes of Russell gulch and B. F. Threewit of Denver, interested in a lease and bond on the Hughes mine on Bellevue mountain, have arranged for the installation of a plant of machinery on that property.

Following a good strike in the 800 east level of the Chicago-Corr mine, Manager Bruce M. Myers has erected new buildings and is installing a complete hoisting plant.

Gus Bolander of Black Hawk, in charge of the Coeur d'Alene mine on Academy hill, owned by Chicago people, is to install a 45-hp. hoist on that property, and a full plant on the Parole, which is controlled by the same people.

#### Steamboat Springs

The Moffat railroad will reach the Yampa coal field during the present month. A great many coal mines have been partially opened in that section and shipments of coal to Denver will be regular as soon as the road enters the district. This means the early need of a large number of coal plants.

A new company to be known as the Steamboat Springs Town & Quarry Co., with G. H. Miller as president, is being incorporated. Two carloads of machinery have been ordered for the quarry. The plant for sawing and finishing the stone will be located in Steamboat Springs. Electric power will be transmitted to the quarry. There are large deposits of very fine onyx in the neighborhood and these will also be extensively worked.

#### IDAHO.

##### Mullan

The Acadian Mining Co. is making preparations for the installation of a 2-drill air compressor to be driven by water power. Work will be done in two different tunnels, one of which will be new and, when completed, will be several thousand feet long. The water will have a drop of about 800 ft. The Acadian Co. is controlled by a party of Frenchmen. Alfred Andrieux is resident manager. The company owns a group of claims near the head of the east fork of Deadman gulch.

The National Mining Co. has resumed

work sinking the shaft from the 200 level. A new pump has been ordered, and as soon as it arrives a crosscut will be run to the vein from one of the new levels.

The new crosscut tunnel being driven on the Reinder is now in 1,335 ft. and is going ahead at the rate of 2 1/2 ft. per month. The tunnel will be 3,000 ft. long when completed.

The management of the Monitor mine reports that a large body of sulphide copper ore has been opened on the 400 level in a drift being driven on the vein. The ore body in one place where crosscut is said to be 30 ft. wide. The mine is under bond to H. F. Samuels of Wallace. It is in Shoshone county near the line of the new Milwaukee & St. Paul railway.

The Copper Queen Mining Co. has made amended locations of a large group of claims at the head of Willow creek. The company proposes driving a long tunnel some time during the coming year to open the vein at great depths. The property has good surface showings of copper.

The Silver Cliff Mining Co. has completed a new flume to convey water for power purposes and proposes to continue active development work all winter. New buildings have been erected at the mouth of the lower tunnel and work will be confined to this opening. The mine is under the management of James D. Young, who has shipped some rich copper and gold ore. The company has not yet succeeded in locating the ore shoot on the lower levels.

The Wonderful Mining Co. has completed a crosscut tunnel 1,900 ft. long on a group of claims on Stevens peak. According to stockholders in the company, the lead has been encountered and shows galena and copper in considerable quantity.

The Copper King Mining Co. has located a tunnel site on the west fork of Deadman creek. The location calls for 4,422 ft. and begins at the portal of the new long tunnel now under construction. This tunnel is now in 100 ft. The company's air compressor is now on the ground, the foundations for same have been completed, and the plant will be in operation within a short time. The machinery will be operated by a 24-in. type "C" Pelton water motor, there being a head of 482 ft. of water.

The Mineral Farm Mining Co. has elected the following officers and directors for the ensuing year: Dan McQuarrie, president; M. J. McHugh, vice-president; L. D. Whitmore, secretary-treasurer; Louis C. Jaquish, manager. In addition to the above, the directors are as follows: E. G. Ellis and D. R. Beck, of Missoula, and M. Robert Weidner, of Dalton, Ill. Several men are employed at the property and work will be continued during the winter. The company is in good shape financially.

#### Wardner.

The new 1,000-ton unit mill building of the Bunker Hill & Sullivan Co. is now completed and ready for the installation of the machinery. This plant will double

the capacity of the mine. The old mill of 1,000 tons capacity will be closed and overhauled as soon as the new unit is in commission, and when new machinery has been added the old unit will be run at full capacity with the new unit. The company plans the erection of still another 1,000-ton unit, the grading for which has been completed. The building will be erected as soon as the new unit is complete. These three units will give the Bunker Hill an output of 3,000 tons of crude ore per day. Much of the Bunker Hill ore is now being shipped in crude state and such shipments will continue even after the three new mill units are in operation. The mine now produces more ore than all the Federal mines combined and, when working at full capacity, will produce more ore than the combined product of all the mines in the Coeur d'Alene district. Stanley Easton is manager.

The Coeur d'Alene Cons. Mining Co. has completed two miles of flume to convey water for power to the Wisconsin property near the head of Elk creek. The company will install an air compressor and power drills for driving a new lower tunnel. The Wisconsin has shipped seven cars of ore from the surface workings.

The Caledonia Mining Co., operating near Wardner, is reported to have opened 4 ft. of lead-silver ore in a shaft. The shaft is down 300 ft. and a drift 35 ft. long has been driven to the vein, which shows both clean and mixed galena ore. Charles McKinnis of Wallace is manager.

The Evolution Mining Co. announces that it has completed arrangements with the Ponderay smelter for the treatment of several cars of ore. The mine is located near Osborn.

#### Wallace.

The owners of the Pilot mine at Murray have received returns on a sample of ore weighing 42 lb., which gave high values in gold and silver, besides some zinc. The Pilot is located in a small gulch just outside the town of Murray and is on a small quartz vein, which so far as mined, has shown high values. Only one shipment of the ore has been made, and this with poor success, as the sacks were robbed before they left the mine. The owners make small effort to develop the property.

The Cooney group near Burke will soon commence the shipment of crude galena ore. The company has opened during the past year an ore shoot from 2 to 3 ft. in width, all of which is steel galena of high grade.

The Hecla shaft at Burke is to be put down from the 900 to the 1,200 level. The mine contains three distinct ore shoots and produces from 250 to 300 tons of ore per day. Sixty men are employed.

The Amazon-Mahattan Mining Co., operating on Sunset peak, announce the discovery of a vein of uniling lead-silver ore 6 ft. wide in a crosscut from the main tunnel. The vein is parallel to the one found in the main tunnel several years ago.

The Idora Mining Co. has leased its mine for a period of six months to Spo-

kane men, whose names are not given out. The company has recently paid off all indebtedness and is in good shape. Several cars of ore have been shipped from the property and a good quantity of ore is stated to be in sight ready for shipping.

The Reno & Idaho Mining Co. has completed arrangements for developing ground belonging to the company through the tunnels of the Great Western Co. near Burke. The company will install an air compressor and drills. The principal owners are the Davenport estate, Charles Eccles and Tom Ryan of Spokane.

The Smuggler-Virginia Mining Co. is developing a group of claims near Burke through the old Trade Dollar tunnel. The company consists of Frank Murphy and Dave Holzman of Spokane.

John Mader of Burke has sold an interest in the Nevadawest claim, located near Burke to Spokane people. Mr. Mader and associates are at present sinking a shaft on what promises to become a producing vein of ore. The material taken from the shaft assays about \$30 to the ton and Mr. Mader states that the quality of the ore increases with every additional foot of depth.

## INDIANA.

### Indianapolis.

The coal mining industry seems to have reached the stage of little or no progress over that of previous weeks, due to the continued warm weather and scarcity of orders for lake shipment.

The condition of a large number of unemployed miners has become so serious as to occasion the miners' local union to take steps toward their relief by abandoning the rules of the organization limiting the number of men to be employed. It is the first time in the history of the organization that these rules have been abandoned, and the step is one of great importance. It will enable about 2,000 miners to obtain employment, many of whom have been idle since the first of the mining year. This means that the miners of the district will take turns or divide the work for the present.

A bill has been introduced in the legislature recently called in special session to repeal that section of the law enacted by the regular session, which provides that drills used in coal mines shall not be more than 2 1/2 in. in diameter. This regulation has proved unsatisfactory, especially in the block coal mines. The coal deposits in the block coal field are so firmly fixed that it is necessary to use an extra heavy shot to do effective mining.

During the past week work was started in the Mammoth-Vein and Steel Tipple mine in Sullivan county. Neither mine is running at full capacity.

## LAKE SUPERIOR.

### COPPER.

#### Houghton, Mich.

Closely following the flotation of the North Lake Mining Co., comes the news

of a second flotation, or in all probability a reorganization. The plans, yet in a formative stage, call for a capitalization of 200,000 shares, par value \$25, and embrace the consolidation of the Rhode Island Copper Co. with the Franklin Mining Co. and the acquisition of 640 acres of mineral land from the St. Mary's Mineral Land Co.

The Atlantic Co. continues to obtain a good showing of copper rock on the 12th and 13th levels. The shaft is being sunk for the 14th level and is passing through badly shattered ground, requiring close timbering. The south drift at the 12th level is being driven toward the Baltic boundary, and will eventually connect with the Baltic's drift on the 12th level, thus affording better ventilation and providing a new avenue of escape in case of accident in the underground workings of either property. This drift, hatched within 35 ft. of the Baltic line, has attained a length of over 500 ft. south of the shaft and opens up about 160 lateral feet of copper rock of a good stamping grade. The lode, tapped at the 13th level by crosscut, is showing up much better than when first encountered about 10 days ago, developments the past few days showing the lode at this point to be fully as rich as that opened on the 12th level, 100 ft. above. A rock crusher has been installed and, although the mine is not ready to maintain a regular production because of the limited amount of stopping ground opened, it is planned to crush such copper rock as is obtained from opening work in progress, and send the rock to the stamp mill for final treatment.

A spur track connecting the Ojibwa mine with the Keweenaw Central railroad was completed this week, and provides that property with first class transportation facilities. Both shafts are well below the 400 mark, and crosscutting to the lode will be begun some time next month. The shafts are well in the foot wall, about 70 ft. from the lode, and it will, therefore, be a little over a month from the time crosscutting begins before the lode is disclosed at this point. Both drifts in the No. 2 shaft are faced in a fairly good grade of stamp rock. Concrete collars are being constructed in both shafts. A permanent steam hoisting plant is also in course of erection. The mine has been well opened up considering the limited amount of power available and, with the steam plant in commission by the first of the coming year, drifting and sinking can be carried on simultaneously in both shafts.

The Adventure Co. is continuing diamond drill operations with more or less success, one or more cores obtained from different depths in each of three holes put down to date, showing a surprising amount of copper. Three lodes have been disclosed by diamond drilling, during the past four months, but whether or not one of the three is the much sought-for Lake Isomine is a question, and upon which the management expresses no opinion. A new drill hole will be put down vertically to determine the dip and also the depth of the lode below surface at a

point where a new shaft may later be sunk.

At the Wyandot the piece of sand pipe which collapsed while being driven through the overburden has been replaced and drilling in rock is expected to be under way by Oct. 1. The drill hole is in what is believed to be the horizon of the Lake lode. A crosscut from the bottom of an old shaft, recently deepened to 700 ft., will, if calculations prove correct, encounter the lode in about six months, and the drill with 300 ft. of drilling.

A spur track has been constructed by the Copper Range railroad to provide transportation facilities for the North Lake Mining Co. Supplies delivered at the North Lake property the past week include a diamond drill outfit. The first of several diamond drill holes will be put down at once.

The Lake Copper Co. is preparing to drift on the second level. The shaft, which is going down steadily, has attained a depth of over 325 ft., good copper ground lying exposed from grass roots to bottom. No drifting is in progress north at the first level and not much good copper ground was disclosed there, but the south drift continues through copper ground of considerable richness and is in about 265 ft.

At the Ahmeek the overburden is being stripped from the site of the new shafts, which are to be sunk on the north end of the property. A boiler has been installed and steam power will be available within the next few weeks. The company is now operating two shafts and is producing at the rate of 600,000 lb. fine copper monthly. The company is still having its rock treated in the Tamarack and Osceola mills, but its increasing rock output makes a mill of its own imperative in the near future.

## IRON.

Marquette, Mich.

While much work has already been accomplished in connection with the establishment of the Minnesota Steel Co.'s works at Duluth, the operations have been of a preliminary nature, very largely, and not until next spring will actual construction be in progress on a considerable scale. This plant of the United States Steel Corporation will take rank with the most important in the country. It will not be as large as the mammoth works at Gary, Ind., nor yet as large as various establishments in the east, but it is designed to serve a large territory and it will be pretentious from the very start. The plans are understood to call for an initial expenditure of \$11,000,000. These plans are subject to expansion, however, and it is stated that the matter of enlargement is already receiving consideration. As it now stands, the project calls for two 500-ton blast furnaces, seven 60-ton open hearth furnaces, one 40-in. bloom mill, one 28-in. and one 18-in. finishing mill, one duplex mill with 11-in. and 8-in. finishing plants, and 150 byproduct coke furnaces. There will be a belt-line railroad, a 40,000,000-gal. pumping plant, shops, and

100 dwelling houses for employees. The site has a water frontage of three miles. There is plenty of ground for all needs, present and prospective. The belt-line railway, the construction of which is in progress, will be 30 miles long. Leaving the Steel Corporation's Duluth, Mesabi & Northern railroad at Adolph, the line will extend directly to the works via an abandoned right of way of the Duluth & Winnipeg road. It will cross the St. Louis river over a large 2-deck drawbridge already authorized by congress, and, proceeding through Wisconsin, will terminate at the end of Wisconsin point. The line will have access to all the railroads tapping the region and will have direct connection with all but two of them on the Minnesota side.

## MISSOURI-KANSAS.

Shipments of lead and zinc ores for the week ending Sept. 19 show a falling off from the previous week in both tonnage and value. The shipments from the various camps for the week and year were as follows:

### LEAD ORE SHIPMENTS.

	Week Sept. 19.	Jan. 1- Sept. 19.
	Lb.	Lb.
Alba-Neck City .....	6,900	195,340
Aurora .....	9,000	248,280
Badger-Peacock .....	22,140	914,820
Carl Junction .....	1,580	135,030
Carthage .....	.....	12,460
Cave Springs .....	16,000	11,220
Duenweg .....	98,510	2,246,981
Galena .....	164,160	4,825,352
Granby .....	.....	1,249,120
Joplin .....	370,170	10,573,820
Miami .....	124,510	3,361,420
Oronogo .....	.....	467,230
Peoria .....	.....	1,930
Prosperity .....	116,540	3,289,740
Quincy-Baxter .....	.....	650,490
Seneca .....	.....	27,020
Springfield .....	.....	10,160
Spurgeon .....	71,460	1,623,880
Webb City-Cartersville .....	275,410	27,618,027
Zincite-Sherwood .....	.....	142,290
Total .....	1,276,360	56,830,881
Value .....	\$76,075	\$1,582,287

### ZINC ORE SHIPMENTS.

	Week Sept. 19.	Jan. 1- Sept. 19.
	Lb.	Lb.
Alba-Neck City .....	555,070	18,007,970
Arkansas .....	.....	.....
Aurora .....	487,000	12,008,290
Badger-Peacock .....	245,480	10,668,750
Carl Junction .....	143,450	1,554,860
Carthage .....	305,720	6,134,116
Cave Springs .....	.....	900,780
Duenweg .....	168,020	19,885,080
Galena .....	944,710	26,223,655
Granby .....	430,000	18,459,200
Joplin .....	2,465,760	81,236,120
Miami .....	347,310	7,807,728
Oronogo .....	192,670	13,341,700
Peoria .....	12,770	.....
Prosperity .....	467,120	11,698,161
Quincy-Baxter .....	184,760	4,481,260
Seneca .....	.....	171,810
Sherwood .....	.....	3,154,180
Spurgeon .....	.....	54,670
Stott City .....	406,710	8,376,120
Webb City-Cartersville .....	3,172,580	110,178,125
Westworth .....	.....	821,170
Zincite-Sherwood .....	64,340	2,462,685
Total .....	10,555,580	362,415,047
Value .....	\$188,143	\$6,142,589

Joplin, Mo.

The incline shaft on the Temagami lease is nearing completion. The mouth of the shaft will be near the mill, while the ore will penetrate unmined ground. The ore is found at 185 ft., although the shaft will be 242 ft. deep.

The old Miami mine at Chitwood has

been leased by the Hennessy Mining Co. and the old shaft will be opened at once. Pumps have been installed and the ground is being drained. Operations are carried on at 150 ft.

A tailings mill has just been completed on the Blackberry lease at Smelter hill. A large tailing pile is ready for treatment.

A new shaft has recently been completed at the Montana and connected by a tramway with the mill. A second one is being sunk.

James Holt has developed the latest mine on the W. E. Johnson land. A shaft is down 90 ft. and is in good ore. A 20-ft. face of rich dirt has been proved by drilling and will be available soon.

#### Webb City, Mo.

The Lewis Mining Co. has opened an old shaft sunk 14 years ago and abandoned as worthless and, after sinking 2 ft., entered a rich run of lead and zinc.

The Coahuila Mining Co. is completing the new large mill on the lease in Porto Rico.

The Meadville Mining Co. will resume operations in the Porto Rico camp after a shut down of a month. The shaft will be doubled in size. The principal ore mined is lead found in a sheet formation at 180 ft.

The shaft on the Florence M. Scholl lease at Prosperity is now down 80 ft. and will be sunk to 250 ft. to permit of a deep sump.

An 80-ft. extension is being added to the plant of the Oronogo Circle Mining Co. No. 5, which will be equipped with 11 sluuge tables to properly save the fines.

#### Granby, Mo.

Plans have been made for the erection of a new 250-ton mill on the Granby Mining & Smelting Co.'s land in this camp. The new mill will be equipped to handle silicate. The old mill, in operation for about 25 years, will be discarded.

The Little Boss Mining Co. has developed a rich tract of land in Granby and will erect a new 100-ton concentrating plant.

#### Aurora, Mo.

The entire holdings of the United Zinc Co. in the Aurora field have been leased to the Magnolia Lead & Zinc Co. On the west forty the royalty is 10%, on the forty east of this 20%, on the east forty 10%. The higher royalty is demanded because of the more developed character of the ground and the use of the concentrating plant and machinery. Work will be begun by the new company Oct. 1.

The mining situation in the Aurora camp is more favorable than for any time since the panic.

#### Damsel, Mo.

During the past year more interest and activity has been manifested in the development of old prospects in the Central Missouri district, known to be well mineralized, than for many years. This is due to favorable geological reports and numerous strikes of good galena deposits.

The Hunter mines, near Damsel, are the most prominent in the district. This property was a big producer in the early

seventies, when the McClurg & Murphy smelter, near Linn creek, five miles distant, was in operation. The Damsel Mining & Smelting Co. has a lease and option on the Hunter, besides buying other tracts during the year, in all 300 acres including a town site. The development consists of a 20-ft. shaft, and 120 ft. of drifting east and west. These drifts, 60 ft. each, were driven on a vein of galena, 6 ft. wide and assaying about 35% lead. Besides the work on the east hill the company is sinking a shaft on the west hill. This shaft is now down 55 ft. and has developed much disseminated lead. New equipment is delaying work in this shaft at present.

#### Miami, Okla.

John Chester and associates have taken a lease two miles north of Fairland.

The Enid Mining Co. is taking leases near Ottawa and is prospecting thoroughly.

A rich drill strike has been made by W. P. Ross of Muskogee, northwest of town. Three distinct runs of ore were encountered in one hole ranging from 77 to 130 ft. A shaft will be sunk and additional drilling done.

The King Jack, a recently completed plant, has been running several weeks and is proving one of the large producers of the camp.

## MONTANA.

#### Butte.

Orders have been received to prepare for a resumption of work in the East Butte Co.'s mines and Superintendent Vail is unwatering shaft No. 1 and the lower workings. There is very little water in the East Butte mines as the ground is pretty well drained by the deeper workings of the Amalgamated and Coalition mines adjoining. Several sets of leases are working on the upper levels, but the company will give no further leases.

Butte stockholders of the Davis-Daly Estates Copper Co. have received official notice of the action taken at the recent meeting toward the organization of a new company to be known as the Davis-Daly Copper Co., and provision for the exchange of stock on the payment of \$2 per share.

The state board of railroad commissioners has made an order directing the Northern Pacific Railway Co. to reduce rates on ore shipments from all points in Montana to Butte and East Helena. The order is the result of a recent hearing on ore rates. The rate reduction amounts to 30% on shipments to Butte and 17% on shipments to Helena. The same order will soon be issued to other roads. Hereafter freight rates on ore have practically been prohibitive to small operators throughout the state, and with the high railroad and smelting rates work in outside districts has been discouraged.

The danger of a coal famine in Butte has probably been averted by a temporary adjustment of the coal strike troubles in northern Wyoming. The miners of three of the large companies operating there have accepted a proposition to return to work pending a settlement of

their grievances. In southern Montana, however, the miners are still out and it seems to be the determination of the Union Pacific and Amalgamated Copper Co. to fight the trouble out. The Union Pacific has a large amount of coal stored and is also purchasing coal elsewhere. The Amalgamated Co. also has much stored and has other sources of supply. The threatened trouble in Montana has not been abated.

With the exception of the interruption to mining in the Anaconda mine by the presence of gas, all of the properties of the Amalgamated Copper Co. are again working. Last week it became necessary to lay off all the men employed in the Anaconda mine because of a fresh inflow of gas which rendered it impossible to use the shaft. The interruptions from this cause have been more frequent during the last six months, which seems to indicate that the fire trouble is becoming more serious. The latest outbreak was chiefly in the shaft and during the shut down some mining was done through the St. Lawrence and Never-sweat shafts, both of these mines being connected with the Anaconda. The latter employs about 500 men and about 550 tons of ore per day is hoisted.

The resumption of operations in the Pennsylvania mine adds considerable to the production of the Butte Coalition Co., as the Boston & Montana, under a mutual agreement, mines some jointly-owned ore bodies known as the Red Penn, in which the Butte Coalition has a 40% interest. The ore is of a very high grade. The Butte Coalition Co. is mining about 900 tons of ore daily and is carrying on much development work.

The Pilot-Butte Copper Mining Co. will not abandon the Pilot claim, but will resume work on it shortly, according to a statement that has been made by George H. Stanton, counsel for the company. Development work will be carried on until the value of the property is fully demonstrated. When sinking is resumed an entirely new surface plant will be installed. The shaft will be carried to a depth of at least 1,500 ft. and probably 2,000 ft. The work will be under the direction of John Rylands. The shaft of the Pilot has a depth of 500 ft. and is one of the best-built 3-compartment shafts in the district.

#### Helena

A strike of 4 ft. of copper ore, said to average about 30% copper, is reported to have been made on the property of the Wolf Creek Mining Co. at Wolf Creek, about 40 miles east of Helena. The find was made in the shaft being sunk, several hundred feet from the point where ore was first discovered. The ore body is said to be increasing in width as depth is gained. A tunnel is being run to tap the ledge at a depth of about 200 ft. at a point under a 40-ft. shaft in which copper ore was discovered several months ago. The tunnel is in 250 ft. and will intersect the new shaft when the latter has reached sufficient depth.

#### MISCELLANEOUS CAMPS.

Phillipsburg.—About 50 men are at work at the Hannah property of the Mil-



waukee Gold Extraction Co. at the head of Flint creek, three 8-hour shifts being employed in the mine and two 8-hour shifts in the mill. As soon as possible the mill will be run continuously day and night. The electric lighting plant and the telephone system are being put in shape for service. Operations are being carried on in the name of O. F. Dwight of Milwaukee, Wis., president of the company and trustee. E. H. Fitcher is manager.

**Tower.**—Owing to the high smelter charges for treating the ore from the Trout mine, the Trout Mine Syndicate has shut down this mine for an indefinite time. The pumps have been taken out and lower workings will be allowed to fill with water. The high charges for treatment of the ores, which carry about 65 oz. silver and some zinc, are due to a penalty for the zinc which brings them up to \$23 per ton. It is intimated that the Trout Mine Syndicate will eventually build a reduction plant of its own and save both the zinc and silver values.

## NEVADA.

### Goldfield.

The Goldfield Apex Mining & Leasing Co., the merger of the Velvet, St. Ives, Gold Horn and Potlatch properties, has begun work on blocks Nos. 9 and 10 of the Goldfield Cons. Mines Co. Two shifts are at work. The company has been financed by Salt Lake people. Frank McNeill is general manager.

The Goldfield Merger Mines Co. has started work on the Gold Horn and three shifts are at work in the shaft, which is being sunk at the rate of 6 ft. per day. The shaft was sunk to a depth of 300 ft. by former lessees on the property. Numerous crosscuts will be run and the ground will be thoroughly prospected. An additional shaft will soon be sunk on one of the other properties of the merger. Several leases have already been let and work on them has commenced.

The Florence-Jumbo Lease Co. has reached the 355 level on its lease, formerly known as the von Polenz, and is putting in a station preparatory to cross-cutting the ledge encountered on the 250 level. Manager George F. von Polenz expects to be hoisting ore in a few days. A new electric high-speed high-power hoist has been installed. The old gasoline hoist will be left in reserve for use in case of breakdown or lack of power for the electric hoist.

Arrangements have been completed for starting work on the Goldfield property of the Scotia Cons. Mining Co. and later on the Ubeheche property. The affairs of the company are reported to be in good shape and work on the several properties will be pushed. At the annual meeting of the stockholders held Sept. 1 the following directors were elected: R. M. Dixon, Lewiston, Maine; James A. Smith, Brookline, Mass.; Chas. D. Redmond, Boston, Mass.; C. C. Cook, Atlantic, Mass.; Dr. Chas. R. Whitecomb, Roslindale, Mass.; Geo. S. Wyma, Waltham, Mass.; W. L. Cook, Boston, Mass.

At a directors' meeting following, R. M. Dixon was elected president; Jas. A. Smith, vice president; W. L. Cook, secretary and treasurer, and C. C. Cook, assistant secretary.

The Red Top Cons. Lease Co., operating on the north end of the Red Top, has encountered the high-grade ore on the 150 level that was first found on the 225 level. The ore shows streaks of free gold.

General Manager Thomas G. Lockhart of the Florence Goldfield Mining Co. has extended the Baby Florence lease from Dec. 6, 1908, to Feb. 6, 1909. By the conditions of the extension the 'ground' sublet to the Florence Jumbo Mining Co. has been taken from the Baby Florence and the Zinn Florence gets 50 ft. of the north end of the Baby Florence territory. Miners of the Baby Florence Co. are stopping ore from the ore shoot opened on the 150 level and some good ore has been shipped.

The Gem Florence lease also has been extended six months. This lease adjoins the Baby Florence on the south.

### Tonopah.

Extensive and satisfactory development work is reported from the Belmont mine. Important work is being done at several points on the 1,000 level. The vein being opened in the west drift along the north or hanging-wall side of the Mizpah fault is improving both in size and values. The entire 4-ft. ledge makes high-grade shipping ore. A station is being cut preparatory to installing a hoist for sinking for the ledge. Ore from the winze on the large vein on the 1,000 level is decreasing in grade, but an improvement is noted in the raise from the east drift on the south vein on the 900 level, in the top of which 4 ft. of good milling ore is exposed. Less important work is being carried on the 700 and 800 levels.

At the annual meeting of the stockholders of the Montana-Tonopah Mining Co., held in Tonopah on Sept. 8, the following board of directors was elected: Charles E. Morris, Henry D. Moore, F. M. Kirk, Thomas J. Lynch, J. J. McQuillan, John Hinkle, Charles E. Knox, W. B. Alexander and R. P. Dunlap. The old officers were re-elected as follows: Charles E. Knox, president and general manager; Charles E. Morris, vice-president; R. P. Dunlap, vice-president; W. B. Alexander, secretary-treasurer; Edgar A. Collins, superintendent. It was decided to begin important prospecting work at once and to begin sinking a 3-compartment winze on the 765 level at a point north of the shaft to open up ground below the dacite intrusion. This step was considered of more importance than to run the mill at full capacity on the company's ore, the shaft being too small to hoist sufficient ore for this purpose as well as waste from the dead work. Arrangements have been made with the MacNamara Co. to furnish from 40 to 50 tons of ore daily. This with the company's ore will keep the 40 stamps dropping. Development work or stoping is being done on many levels.

The Midway Co. has completed a station in the shaft at the 200 level and has

made preparations for doing considerable prospecting work. A south cross-cut out 110 ft. will be continued to open up the southern portion of the ground at this level. The east drift on the south vein on the 900 level is out 150 ft. and the face shows from 12 to 15 in. of good ore. The stopes on the south vein on the 400 level are being carried up and show values similar to those on the 300 level. From 2 to 3 ft. of high-grade ore is being taken from the stopes between the 400 and 450 levels on the Brougher vein. The drift on the 500 level is still following the fault on the Brougher vein. Good ore is found in spots.

### Rhyolite.

Seven men are to be put to work at the Mayflower Bullfrog Cons. property. Two machine drills will be used. The work will be in the nature of exploration preliminary to the erection of a test plant. Superintendent A. Sidney Addison has been preparing for the resumption.

The shaft of the Edelweiss Co. operating on the east slope of Ladd mountain is now down 110 ft. Grading is being done for the installation of a whim and after this is ready sinking will be continued. The bottom of the shaft is all in good milling ore. Lateral development will not be undertaken until the vein has been followed to greater depth.

Work will probably soon be begun at the Homestake, which was closed down, it is said, for a clean up, to make a change of management and to make an adjustment with the Colorado Iron Works, which built the mill. S. B. Tyler is now mill superintendent.

### Ely.

Prospecting work at Copper Flat by means of Keystone drills is yielding excellent results. No. 3 hole stopped in ore at 240 ft. Ore was struck in No. 4 hole at 82 ft.

Preparations are being made at the Copper Flat stripping for the coming of winter conditions and it is expected that operations and production will continue without interruption.

The copper production at Smelter is in the neighborhood of 30 tons daily, but it is expected that this will soon be materially increased. Everything, with the exception of some minor parts, is working smoothly. The second reverberatory furnace is running, while the first is being gone over. It is expected that both will soon be in steady operation. Fairly good progress is being made with the excavation for the fourth unit. Rapid progress is being made with the third unit.

As soon as the station on the 1,200 level at the Giroux is cut, sinking will go ahead from the 1,200 to the 1,300 level. The mine is in good condition on the lower levels and there is some good ore at several points.

It is expected that sinking will soon be resumed at the Boston Ely, as it is believed that a large body of commercial ore will be encountered.

### Searchlight.

The Searchlight-Parallel Co. has leased the Cyrus Noble mill and is milling the

ore dumps from the Elvira and Birdie shafts preparatory to resuming work underground. The dumps contain, it is estimated, not less than 300 tons of ore running from \$20 to \$60 to the ton. About 200 ft. of ground is ready to stope in the Elvira shaft and over 100 ft. in the Birdie. T. D. Forney is superintendent and the mill is in charge of L. L. Woodman.

The Searchlight Cons. Co. has resumed operations at the Oregon and the main shaft is being unwatered preparatory to continuing sinking. H. L. Norman is in charge of the work.

Work is to be started up at once on the property of the New York-Searchlight Co. General Manager W. W. Hurt has let a contract for 200 ft. of cross-cutting on the 200 level of the Water Spout. The Eddy Machinery Co. of Los Angeles, Cal., is preparing plans and specifications for new equipment; necessary to operate the property on a large scale. Mr. Hurt has also let a contract to sink the shaft on the Golden Dipper to water level, which is approximately 200 ft. This work will be followed by drifting.

#### MISCELLANEOUS CAMPS

**Chafey.**—The Balaklala Co., owning the independent smelter at Coram, Shasta county, Cal., has signed a contract to treat all of the dry ores from the Chafey camp for a period of three years. The terms are such as to give a profit of \$3 per ton net more than it has been heretofore possible to obtain.

**Cuprie.**—J. E. Austin and associates of Los Angeles, Cal., have 14 men and a 4-horse team at work removing waste rock from their sulphur claims. Fifty feet of the deposit has been cleared.

**Buckskin.**—The Kennedy Cons. Co. has started work with 30 men on two shifts. Development work only is being done. At the time of the resumption of work the shaft was down 170 ft. and will be sunk deeper before much ore is taken out. Ore taken out in development work runs about \$60 to the ton in gold.

The Albany Copper Co. is working 12 men two shifts after a period of inactivity. There is a large body of low-grade copper ore on the property.

**Battle Mountain.**—Operations are soon to be begun on the Peggy group, bonded some time ago by H. E. Taylor. Eastern men have been interested in the property and it is the intention to push development work and to install a mill at an early date. The group comprises 80 acres with veins carrying good values in gold.

**Pioche.**—Sinking of the shaft on the Baltimore is being pushed under the direction of General Manager Mahedy. A dark-colored manganese rock carrying values as high as 60 oz. in silver is now being encountered.

**Jack Rabbit.**—Sinking on the Onondago shaft on the property of the Nevada-Utah Co. is being pushed. Twelve feet per day is being made with three shifts. The shaft is now down to the 600 level and it is believed that the desired depth will be reached by the end of September. A

drift is being run from the Day mine to connect with the Onondago.

## NEW MEXICO.

### Red River.

The Edison mine at Anchor in the Red River district, Taos county, has been bought by the Lillian Mining Co. which will do extensive development work. A shaft is being sunk to a depth of 200 ft. to open ore bodies at that level. The property is equipped with a 10-stamp mill of 25 tons daily capacity. The ore is quartz with hematite and free-milling gold values. No ore will be milled until the new shaft is completed. George B. Paxton is in charge of the work.

### Silver City.

The Vicraywin group in the Hachita section has been sold by H. L. Marmion to a company to be known as the Vicraywin Mining Co. The group is on the hill back of the King mine.

The King mine has been partly unwatered and, it is believed, will be worked.

## OREGON.

### Grant's Pass.

The Scribner & Henderson gold properties in the Wolf Creek district have been purchased by W. H. Burghardt of Portland, and Joseph Dysert, of Grant's Pass. The new owners will develop at depth and equip the property for extensive operation. The property is located on a belt of diorite one-quarter of a mile wide. The oxidized, gold-bearing portion of the belt is from 20 to 40 ft. deep, with values all the way through. In the years that it has been worked two tunnels were driven, one to a depth of 500 ft. and the other 800 ft. The new owners have begun a direct shaft, and will sink it to a depth of 500 ft. A mill, suitable for reducing the stuff of which the big dike is composed, will be placed.

The company that recently purchased the Golden Wedge mine, of Galice district, is preparing 10 additional stamps and is enlarging the cyanide and concentrating plant. The new equipment will be placed at once and the mine will be operated on an extensive scale from this winter on. For a number of years the property was operated very successfully by Willis Kremer, and later by Thien brothers. The present company has headquarters in Pittsburgh, Pa. The mine has produced over \$100,000.

Dr. J. S. Diller, of the United States Geological Survey, and Professor G. F. Kay, of Iowa City, have just completed a thorough inspection of the mineral resources of southern Oregon. They have investigated the gold and coal districts of Josephine, Douglas and Coos counties.

The properties of the Lees Creek Gold Mine Co., on Myrtle creek, will be operated this season by the shareholders under the management of M. J. Dicks. This company, as a company, is defunct, but the properties, consisting of a vast acreage of placer ground on upper Myrtle creek, were turned over to the shareholders, who hope to get back all of the money invested and at the same time de-

velop what appears to be an excellent and promising placer proposition.

That there is an abundance of tellurium ores in southern Oregon, particularly in the Josephine Creek, Canyon Creek and Lightning Gulch districts, is amply proved by the results secured in the development of the properties of the several companies operating in that section. Several shipments of rich tellurium ore have recently been made from the Lightning Gulch mines. The Anderson & Bowden properties of Canyon creek are also shipping a quantity of rich ore.

## SOUTH DAKOTA.

### Deadwood.

It is expected that within a short time work will be resumed on the Oro Hondo property near here. A shaft was sunk 1,000 ft. and drifts of 1,000 ft. in each direction were run without encountering anything but stringers of ore. The ground adjoins the Homestake holdings and it has always been supposed that the dip of the ore was not properly gauged when sinking the shaft. A well-equipped hoist was erected on the ground and is still in good condition.

Preparations are being made at the Lucky Strike Gold Mining Co.'s property on Elk creek south of here to resume work at once. Twenty men will be put to work at opening more thoroughly the ore bodies that have been partially exposed under the direction of the Allen brothers. The main shaft, down 200 ft., will be sunk another 100 ft., and 600 ft. of drift work on the lower levels has been contracted for. Later it is intended to sink to the 400 level, which will then be opened up. The ore bodies now average about \$4 in gold to the ton and are amenable to the cyanide process. The company has a 150-ton stamp and cyanide mill on the ground, which will be operated as soon as the ore bodies are sufficiently opened up.

The treatment process at the mill of the Minnesota Mines Co. in the Maillard district has been so successful that it has been decided to increase the capacity of the plant. The mill is now running about 80 tons daily and a new Chilean mill and other equipment that will increase the capacity to 150 tons daily have been ordered and will be installed in a few weeks. The mill has an ideal location and a good gravity system of handling the ore which averages about \$20 to the ton in gold. Thirty men are now employed on the property and this number will be materially increased as soon as the addition to the mill is completed.

The Ohio Beaver Creek Mining Co. is preparing to treat the rich placer deposits of Beaver creek north of here on a large scale. The company has a washer that has been tested and found to do effective work. While the beds that the company is to work were worked over in earlier days, the coarser material was all thrown aside.

### Hill City.

Superintendent Walker of the Gold Medal Co. has placed men at work on the Golden Summit property near here and as soon as the timber is sawed the shaft will be widened and sunk deeper.

The Golden Summit and Gold Medal properties are to be worked jointly.

W. W. Olds, one of the principal owners in the Custer Ruberta mine near here, is making some extensive improvements on the property. In addition to the 10-stamp mill a 30-ton cyanide plant is in process of erection by Al. Burnham of Custer. C. A. Overmire, formerly with the Golden Reward Co., will have charge of the cyanide plant. The assay values of the Ruberta ore are from \$15 to \$20 to the ton in gold, only a part of which can be saved by the milling plant.

## UTAH.

### Salt Lake.

The Pittsburg Cons. Mining Co. has purchased the Pioneer group of 10 patented claims, adjoining its property in the Little Cottonwood district. These properties are on the divide and extend both to the Little Cottonwood and American Fork side of the range near Alta. The property can best be operated from the American Fork side, and from this side is being driven a tunnel to cut under the ore already uncovered in the upper works, at a depth of some 200 ft. This tunnel has already been driven a little more than 200 ft., and there remains about 200 ft. yet to be driven. Two good bodies of lead-silver ore have been encountered in the upper works, one about 16 ft. wide and the other about 30 ft. wide.

The crosscut to the north from the main tunnel of the Flagstaff at Alta has cut into mineralized lime carrying small particles of sulphide. The face of the drift is all in this character of rock.

With the four additional units in commission, at the Boston Cons. mill at Garfield, the plant will be handling nearly 2,000 tons of the porphyry rock per day. The new compressor at the mine has been placed in commission, so that a full supply of ore can be assured for the mill.

The first car of ore from the Mountain Lake property was sent to the Tintic smelter last week. It was taken out from the fissure, encountered by the crosscut from the 8,000 ft. tunnel. The ore carries copper, silver and gold. The face of the crosscut is all in ore of this nature at this time.

The property of the Imperial Mining Co. in Beaver county is now owned by the Nevada-Utah Co. For the past 18 months J. W. Ball has had charge of the development of the property and during that time he has taken out and shipped ore to the value of over \$16,000. Since the transfer Mr. Ball has not been concerned with the property.

Work has been begun on the property of the King David Co., which adjoins the Horn Silver at Frisco in Beaver county. A shaft is started near the Horn Silver lines, which is to go down and cut into the ore vein, which has been shown to run in the Horn Silver toward the King David ground. Preparations are being made for the installation of a complete hoisting plant.

The drift on the 700 level of the Iron Blossom at Tintic has encountered the ore. This drift was driven through about 35 ft. of porphyry before encounter-

ing the ore. This now makes ore showing on the 400, 500 and 700 levels. The 600 level has not been cut through. This demonstrates that the ore is going down to depth.

At the Tintic Standard the timbers are being set and preparations made for the installation of a skip. The station on the 420 level is enlarged so that necessary room is had for handling the skip. This will do away with the hoisting by the bucket and much more rapid progress will be made in the handling of the dirt, and the cost will be correspondingly reduced. Better progress will also be made in the driving of the drifts from this level.

The effort to have the capital stock of the Lower Mammoth increased from \$50,000 to \$300,000 has failed. The idea of the proposed increase was to provide, immediately, funds to send the main working shaft down to 2,000 ft. It is now down 1,200 ft. and the rich ore body has been encountered at 1,600 ft. This makes it necessary to handle the ore twice and to have two hoisting plants in commission. Those defeating the proposition to increase the stock believe that enough ore will be mined and at sufficient profit to permit of the sinking of the shaft to the 2,000 level and develop from here as the mine warrants. The first lot of ore sent from the new body carried an average value of \$96.40 to the ton and the ore values are apparently on a slight increase.

Fire recently completely destroyed the hoisting plant of the Little Chief Mining Co., just outside the city limits, at Eureka, Tintic district. The loss will be upwards of \$15,000. There was insurance of \$6,000 on the plant. J. R. Van Evera of Marquette, Mich., is president of the company.

## WASHINGTON.

### Republic.

A contract has been let to sink a new shaft on the Railroad mine, northward from Orient.

The First Thought Gold Mines Co. is entering on new development work and is now employing 10 additional men.

The Beecher Co. has recently laid out a new camp nearer the mine. Lumber is on the ground for new buildings, and ore bins and a new sorting house are under construction. New wagon roads are being built for hauling ore and supplies. The shaft on the mine is now down over 100 ft. and a drift from it follows a rich stringer of ore which averages over \$100 to the ton. After the stringer is stripped the ore is broken down on canvass, to prevent loss of the free gold. This stringer is believed to be a spur from the main vein, a contact between diorite and porphyry, which traverses the property about 100 ft. distant from the main workings of the mine. The company is planning to equip with new machinery, a compressor plant being particularly needed. John Gilpin of Orient is superintendent.

The ore bins at the Globe mine are being filled and shipping will be begun without delay.

At the Copper Butte mine on Toulon

mountain, a new body of ore has been discovered, which promises to develop considerable strength and value.

The Blue Grass Gold, Silver, Copper Mining Co. has been organized, with headquarters at Orient, to operate the Mountain Chief and Katie claims on Toulon mountain. J. J. Noel is the president and G. A. Dahl secretary.

The North Star Mining & Milling Co. is developing its property and has cut a 4-ft. vein of free-milling ore in the main tunnel, 174 ft. from the portal, at a depth of 59 ft. The ore is identical in appearance with the First Thought ore, but not so rich. It averages \$8.26 per ton in value.

Supplies have been delivered at the Summit mine, five miles north of Orient, and work has been resumed.

Men have been hired for the resumption of work on the Tenderfoot mine, on Sulphide mountain, near Marcus.

Work will soon be resumed, with a good force of miners, on the Robina mine, near Bossberg. There is 100 tons of silver-lead ore on the dump, ready to be hauled to the Spokane Falls & Northern railway, for shipment to the smelter. The Bossberg siding is only a mile from the Robina mine.

A new incorporation is the Deer Park Mining Co., of which A. M. Wood is the president and F. E. Hosking the secretary. The main office is Deer Park, Stevens county. This company has negotiated for title to a group of tungsten claims, about 12 miles north of Deer Park. During the past month work has been done on the group, disclosing in one place a 4-ft. vein, which shows a compact streak of wolframite crystals 8 in. wide. The company is figuring on shipments at an early date.

The Krug Gold & Copper Mining Co. in Chewelah district is driving a tunnel and has intersected a well mineralized vein, but which shows nothing of economic value. The tunnel is in 108 ft. and is heading for a vein, which, at the surface, shows assay values around \$85 to the ton in gold, silver and copper. It has over 200 ft. further to be driven to tap that vein at a depth of 220 ft. The company is employing only one shift, but expects to increase the force and work two shifts, after completing the tunnel to the vein.

## WISCONSIN.

### Cuba City.

The Dall Mining Co. has just closed a deal for the bulk of calcined ore in storage bins and several hundred tons of high-grade ore assaying better than 60% zinc is going to the smelter. The recovery of lead ore is still very heavy and operating expense is paid from sales made in this product alone. A new shaft is being finished at the west end of the ore run, and will be equipped with a small power plant for hoisting and returning ore cars from the mill. The mill is being connected with the shaft by overhead incline. The Galena Iron Works Co. has a force of mechanics at work installing additional power.

The Board of Trade Mining Co. has

just sold 24 cars of zinc concentrates to N. H. Snow, ore buyer for the Illinois Zinc Co., of Peru, Ill. The ore assays close to 60% zinc off of the jigs. The mine is fully equipped and the ore body has been blocked out.

#### Platteville.

Foundations for a new concentrating plant have been completed for the Cleveland Mining Co., operating on lands formerly mined by the Klondike Mining Co. The superstructure of a 50-ton crushing plant will be completed as soon as possible.

The following have been elected to the new Board of Directors of the Belmont Lead & Zinc Co.: J. H. Riechers, Belmont; F. E. Trenary and J. J. Hemphill, Platteville; F. E. Lancy, Madison, and F. W. Moore, Lansing, Mich. The company has its big shaft completed.

#### Benton.

The mine equipment of the Rico Mining Co., three miles north of Benton, in what is known as the Meeker Grove district, has been sold to the Lyght Mining Co., of Platteville. The sale includes all the buildings and machinery, which are being removed to the Lyght property. The surface equipment of the Rico was built by the Galena Iron Works Co.

Keenan Bros. are shipping 150 tons of coarse drybone to the Mineral Point Zinc Co. The ore brought according to grade \$14 and \$18 per ton.

The Etna Mining Co. is driving a big drift westward to connect with the big east catch extending from the Pittsburgh-Benton eastward and into the Ewing property, upon which the Etna is located. E. T. Malone of Chicago is in charge of operations.

A new 50-ton concentrating plant will be built for the Bureau Mining Co., which recently suffered loss of its entire plant by fire.

#### Hazel Green.

The United States Zinc Corporation has awarded the contract to the Galena Iron Works Co. for a 50-ton magnetic separating plant of the Mathew type. This property was first equipped with a Trego hearth and Waring separator, but the lack of uniformity of the ores handled precluded the possibility of satisfactory results with this type of machine.

J. H. Billingsley of the Frontier Mining Co., and others, have just awarded a contract to the Galena Iron Works Co. for a complete power and pumping plant for the Graham mine.

The Freeport Developing association, operating in the New Diggings district, is installing a 3-drill air compressor and engine on one of the Field leases where a large body of ore has been fully developed. The Galena foundry is looking after the installation of this contract.

#### Highland.

Shipments out of the Highland camp for the past two weeks aggregate close to 1,000,000 lb. carbonate zinc ore, the bulk of which came from the Franklin, Kennedy and Minter Mining companies, and one 50,000-lb. car of blende concentrates from the St. Anthony Mining Co.

## CANADA.

### ONTARIO.

#### Cobalt.

Shipments from the Cobalt camp for the week ending Sept. 12 amounted to 1,907 tons and a total for the year of 155,416 tons. This is an increase of 353 tons over the previous week. The shipments were as follows:

Mine.	Week Sept. 12. Lb.	Year. 1908. Lb.
Buffalo	.....	848,660
Chambers-Perland	.....	61,650
City of Detroit	.....	1,029,490
Coniagas	.....	848,860
Cobalt Central	19,290	229,280
Cobalt Lake	.....	242,465
Cobalt Townsite	.....	234,775
Crown Reserve	.....	192,681
Diamond	666,000	1,892,880
Forster	.....	178,400
Kerr Lake	.....	755,444
King Edward	.....	603,760
La Rose	267,280	6,030,670
Little Nipissing	.....	81,347
McKinley-Durand	.....	2,212,000
Nancy Helen	.....	366,047
Nipissing	394,100	3,831,017
St. George	.....	392,275
O'Brien	257,680	4,943,767
Oriskany	.....	151,700
Right of Way	113,090	845,990
Silver Cliff	.....	23,000
T. & H. R.	.....	27,710
Silver Queen	.....	1,133,870
Temiskaming	102,940	711,580
Trillway	.....	953,800
Trillway	.....	1,907,320

New York bankers, representing a syndicate, have taken over the control of the Moose Horn Mines, Ltd., on the Montreal river. Development work is being pushed day and night by steam drills. Shaft "A" is down 50 ft. Recent assays or ore taken from shaft "C," give good values. Capt. John Harris is the engineer in charge.

A London, England, syndicate has recently purchased the property of the James Township Mining Co., comprising 80 acres in James township in the Montreal River district. It is said that a large amount of money has been set aside for development purposes. Work will be begun about Nov. 1.

Some rich silver ore is being taken from two tunnels and their branch workings on the Silver Cliff property at Cross lake, being worked under option by J. A. Kamara of Toronto. As the results of the work are satisfactory it is expected that a sale of the property will be effected.

The new addition to the concentrating plant at the Coniagas mine has been started up, the first 10 stamps being in commission. The stamps were manufactured by Chalmers & Williams of Chicago and weigh 1,250 lb. each. It is expected that the other 20 stamps will be ready for operation inside of a month. The pulp is being crushed to 30 mesh.

Preparations are being made by a number of companies operating in the Montreal River district to purchase a large amount of mining machinery. Although a number of orders have already been placed, no installations will be made before winter, when the roads are in good shape.

Rumors are current of a possible merger that will take in the La Rose, Nipissing, Cobalt Lake, King Edward and the Colonial properties. The capitalization is mentioned as \$30,000,000.

A new vein of cobalt ore has been found on the 86 level of the Cobalt Lake

mine in a crosscut between 500 and 600 ft. north of No. 4 shaft. The vein is from 4 to 6 in. wide and, like a number of others runs into the lake. It is thought that these veins may change into calcite and silver with depth.

A 20-drill Corliss tandem air compressor has been ordered for the Tumiskaminy property from the Sullivan Machinery Co. of Chicago. It is expected that it will be in running order inside of 60 days. Besides this a hoist of much larger capacity than that now in use has been ordered, as well as additional boilers.

### BRITISH COLUMBIA.

#### Rosland.

A gallows frame is being built over the 35-ft. shaft on the north ledge of the Idaho (Centre Star group) and this shaft will be deepened. A small tonnage of good-grade ore is being shipped from the Le Roi. The usual work is going on at the Le Roi 2, Ltd. The Blue Bird lessees shipped a car of select ore during the week. On the other properties development work is going on.

The following table shows the ore shipments from the camp for the week ending Sept. 12 and for the year to that date:

	Week Sept. 12. Tons.	Year Sept. 12. Tons.
Centre Star	3,390	124,370
Le Roi	1,540	56,355
Le Roi 2, Ltd.	215	19,090
Evening Star	25	788
Blue Bird	25	175
Honestake	25	35
Curlew	25	30
Mayflower	25	35
Red Eagle	25	20
Sunnet	25	25
Giant-California	25	65
St. Elmo	25	25

#### Phoenix.

The following table shows the ore shipments from the Boundary district for the week ending Sept. 12 and for the year to that date:

Mine.	Week Sept. 12. Tons.	Year Sept. 12. Tons.
Granby mines	19,102	719,685
Snodgrass	2,490	1,037
Mother Lode	2,904	138,898
Old Bonanza	2,820	42,828
Brooklyn	.....	4,450
Rawhide	.....	12,030
Sunnet	.....	3,802
Mountain Home	.....	2,450
Atlethan	.....	126
Sally	.....	121
Crescent	.....	50

While the Dominion Copper Co. did not ship during the week, a large force of men was kept at work on the Brooklyn and Rawhide properties breaking ore. The large furnace at the smelter will be blown in in a few days.

It will be seen that the Granby shipments have come up near their normal mark for the week mentioned above. This week showed 3,361 tons more ore shipped than during the previous week.

The returns from the last shipment of 21 tons from the Sally mine, west fork of Kettle river, are at hand. After deducting freight and treatment charges, which amounted to \$80 per ton, the shipment netted the company \$3,175.

The Dykehead claim near Fife has been bonded for \$50,000. It will be worked all winter.

The British Columbia Copper Co. is

negotiating for the Molly Pritchard and Allotston Fraction, in Wellington camp and has secured an option on these properties, which are valued at over \$100,000. British Columbia Copper Co.'s engineers have lately examined the property. The ore is an arsenical iron, carrying good values in gold and silver.

A 160-ft. tunnel is to be driven on the Bruce, Midway.

## MEXICO.

### Mexico City.

The Humboldt Exploration Co. has been organized in New York by General Henry Ide, Willey and Colonel S. W. Ferguson, to develop and operate properties in Pachuca, Guanajuato and Michoacan. The company has acquired options on two properties which are now paying dividends, and which are located in two of the richest districts in Mexico. It also owns valuable properties in New Mexico, Montana and other places in the western part of the United States. The company is capitalized at \$1,000,000, gold, 200,000 shares. The stock is divided into 80,000 shares of preferred and 120,000 shares of common stock, at a par value of \$5.

Among the new mining companies formed to operate in Mexico are the following: The Mexican Standard Mining Co., formed in Colorado to operate at Candelaria, Chihuahua, having a capital stock of \$2,000,000 gold. The Franco-Mexican Mining Co., comprising French and Mexican people, which will exploit mines near Jalapa, Veracruz, \$1,000,000 Mexican money. The Concepcion del Oro Mining Co., organized in Arizona to operate in the Mazapil district of Zacatecas and Coahuila, having a capital of \$100,000 gold. Among the companies, strictly Mexican, formed in that time is the Compania Minera Primavera Centro y Anexos, among whose organizers are Lic. Rodolfo Reyes and Francisco Fernandez Castellot. Its capitalization is given as \$300,000 Mexican and its operations will be at Tlalpujahua.

The Peregrina Mining & Milling Co., after an investigation of the economies resulting from electric traction, has purchased from the Westinghouse Electric Manufacturing Co. an electric locomotive, which will be used to haul its ores between the mine and mill, a distance of about one mile. With this locomotive will be supplied a complete equipment consisting of a motor generator set to convert the alternating current supplied by the Guanajuato Power & Electric Co. to a direct current, also a suitable switch-board and controlling apparatus.

### Guadalupe.

Mammel Cuesta Gallardo of Guadalupe has made a contract with Siemens-Schuckertwerke of Berlin, Germany, for over \$7,500,000 worth of electrical machinery and supplies for his large power and irrigation enterprises. It is probable that even more machinery will be purchased if Mr. Cuesta's plans are carried out. Mr. Cuesta owns valuable power concessions on the Santiago river, a concession for the use of the water of Lake Chapala for irrigation purposes and a

concession for a competing light and power system in Guadalupe. The contract is guaranteed by the Mexican government and specifies that all machinery must be purchased from the above mentioned house, which is bound to have electricity in Guadalupe and at the properties of the Amparo Mining Co. in the Etzatlan district of this state by July 1, 1909. Mr. Cuesta is under contract to furnish this company with 700 hp. for mining and milling purposes.

C. D. O'Brien, Jr., general manager of the Mascota Copper Co. and H. H. Kenkel of Minneapolis, Minn., have closed a deal for the old Garrochas copper mines in the Ameca district. The property is a copper ledge about 100 ft. wide and was once worked by Mexicans for copper sulphate. On the property are a 100-hp. boiler, a 40-hp. hoist, in place, and two No. 5 Cameron pumps, placed there by H. N. Canoll of Guadalupe, who took a bond and lease on the property in April last. Mr. Canoll started a shaft, which is down 98 ft. By the terms of the present deal, Mr. Canoll's bond and lease pass to Messrs. O'Brien and Kenkel. It is the intention to continue the shaft. C. F. Joyce, who has had charge of development work, will remain in charge.

Guy W. Worden of Guadalupe has denounced 14 pertenencias of mineral land near the Cabrera mine in the Hostotipaquillo district. The vein is said to be from 4 to 5 ft. wide and assays give high values in silver with some gold. Mr. Worden will develop the property which he has named the "Anaconda."

### Magimi.

A number of new properties are being opened up in this camp and shipments have been begun from some of them.

The Ojuela mines of the Penoles Mining Co. are producing about 500 tons of ore daily, which is being treated at the company's smelter. The San Carlos, Santo Domingo, Concepcion and San Judas working, all of which contain large bodies of rich ore, are, at present, the principal producers. The refractory sulphide ore, containing arsenic and zinc, found below water level is being extracted only sparingly. The ores above water level are more easily treated and can be extracted at a lower cost. Ore from the new workings on the hill runs high in silica and is very desirable as a flux. It carries good values in gold and copper.

Good showings are being made in the Descubridora mines, which are being worked by Magimi people.

### Oaxaca.

A new electric hoist has just been installed in the tunnel on the Natividad mine in the Sierra Juarez.

Instructions have been given to Place and Eaton by the owners of the Santa Sofia mines to start work at once and rich development so as to block out as much ore as possible before the mill to be erected is ready.

The Old Mexico Mining Co. is erecting a modern mill on its El Carmen property in the Sierra Juarez and is putting in a 6,500-ft. aerial tram to connect it with the mine. The cable, weighing eight tons, will be supported by 18 towers

and two terminals and will carry 70 buckets. The buckets will be filled and dumped automatically. George R. Conings is manager of the property.

### Cananea.

William Kunz has completed arrangements for shipping ore from his mine in the Sauripa district. He has been carrying on work for over a year.

N. J. Purcell, general manager of the Buena Fortuna Gold Mining Co., has purchased several thousand dollars worth of machinery for the company's project in the Pinto mountains in the Magdalena district. It will be shipped to the mines at once over the recently-completed Cananea-Nogales line.

The Belen Mining Co., near Cuspen, has closed down and R. L. Van Dusen, general manager, has gone east. This company has been operating continuously and was unaffected by the dullness that closed so many neighboring mines last fall. New pipe lines and boilers are being installed during the inactivity. A partial reorganization of the company will be made. It is probable that all necessary repair work and the reorganization contemplated will be accomplished by the first of the year and that operations will be resumed by that time. Thomas L. Davenport is superintendent.

The Transvaal Mining Co., a company adjacent to, but not connected with, the Belen, has also ceased operations. At the Transvaal the smelter has been shut down for several months and the mules used to transport the bullion to Nacozari have been sold. It is the intention of Manager A. C. Beauchamp not to make any further shipments from Cupmas, where the smelter is located, until the connection is made between that place and Nacozari by the Southern Pacific. The mines of this company are several miles distant from Cupmas, but an excellent wagon road connects them. They are in good shape and can show more than 10,000 ft. of development work.

The Lornita Mining Co., whose property is near the Puertocito mine of the Cananea Cons. Copper Co., shipped its initial car of ore to the El Paso smelter last week. The shipment was an experimental one and should the returns justify it, others will follow.

The Dawson Gold Mining & Milling Co., which operates the old Creston de Oro mine in the Opote section of the Mocetzuma district, has been made a paying and promising property. The company is now equipped with a milling plant, consisting of two crushers, Lane mill, Willey concentrator and Pierce amalgamators. Some 70 to 85% of the values are being saved, the tailings being impounded in the bed of an arroyo beneath the plant to be worked later on by cyanide. H. L. Roper, of El Paso, Tex., is president of the company, and D. J. McCarthy is manager.

John Alexander and associates, of Douglas, Ariz., have organized the Nacozari Cons. Copper Co., south of Nacozari, and have a small force of men at work driving a tunnel. In the upper workings some good ore has been encountered which resembles that of the Pilares mine of the Mocetzuma Copper Co.

## Corporation Affairs and Finances.

## Official Reports.

The information appearing on this page is published gratuitously for the benefit of subscribers to The Mining World who may be shareholders in mining and metallurgical companies. Investors desiring an opinion on the merits of any particular property should communicate with the mining engineers and bankers mentioned in our advertising pages. Secretaries of companies are invited to correspond with the editor whenever any important business is transacted at their directors' or stockholders' meetings and to send copies of their annual reports when issued.

The following new mining companies have been formed in Utah:

Overland Copper Mining Co., with property in the Willow district, Uintah county; capital, \$150,000; J. T. McConnell, president, and Charles P. Fox, secretary.

The Desert View Mining Co., with headquarters at Ogden; capital, \$25,000; A. Hickenlooper, president, and W. A. Hickenlooper, secretary; property in Lucien district, Box Elder county.

The Conkling Mining Co., with property at Park City; headquarters, Salt Lake City; capital, \$500,000; Nicholas Treweek, president; J. Leonard Burch, treasurer, and George A. Land, secretary.

The Utah-United Copper Co. formed to take over the properties of the Wasatch Mining Co. and Skylark Mining & Milling Co.; capital, \$600,000; John T. Treasure, president, and Charles A. Weaver, secretary.

The Burgess Cons. Mining Co., with headquarters at American Fork; capital, 750,000 shares of a par value of 5 cents; 200,000 shares treasury stock; property in American Fork district; J. C. Burgess, president; J. D. Wagoner, treasurer, and James H. Clark, secretary.

The Cedar-Talisman Cons. Mining Co. is to be incorporated, with a capitalization of \$250,000, divided into 25-cent par value shares, for the purpose of consolidating the Cedar and Talisman properties in the Beaver district, Utah. Each company will receive 175,000 shares.

Directors of the New England Gold & Copper Mining Co., in Bingham, Utah, have declared a 19% stock dividend, payable Oct. 20.

Eugene Meyer, Jr., has resigned as first vice-president and a member of the board of directors of the Newhouse Mines & Smelters Corporation.

The South Columbus Cons. Mining Co. of Utah has increased its capital stock from 300,000 to 500,000 shares for the purpose of acquiring the Columbus-Wedge property at Alta, Utah.

The Seattle Stock Exchange has been incorporated at Olympia, Wash., by A. O. McFall, A. E. Severance, J. F. Kennedy, J. W. Ivey and L. F. Jones. Mr. Kennedy is secretary, and Mr. McFall official caller of the exchange.

At a recent meeting of the board of directors of the Bisbee-Duluth Copper Co. the following officers were elected: Charles W. Hicks, president; H. Harris Bennett, vice-president; C. H. Noyes, secretary; W. W. Carley, treasurer.

The Knickerbocker Portland Cement Co. has certified to the Secretary of State of New York that it has increased its capital stock from \$10,000 to \$10,000,000,

changed its principal office from New York city to Catskill, N. Y., and increased the number of its directors from three to 11. The company operates along the Hudson river. The certificate is signed by S. H. Bassett, of Milford, Conn.; Thomas F. Stevenson, of Brooklyn, N. Y.; and J. D. Dalton, of St. Louis.

A call has been issued for a special meeting of the West-Quincy (Utah) shareholders Oct. 1. It is the purpose of the directors to devise means to put the property in shape for proper development, or if desirable, to make a satisfactory sale.

C. A. Bunker has been appointed receiver of the Monica Mines Co., which President Tillinghast says is solvent and has spent to date about \$350,000 on its property in Yavapai county, Arizona. The company has an indebtedness of \$150,000.

The Diamond Gold Dredging Co., incorporated in Arizona, with property in Brazil, has opened offices at 30 Church street, New York City. The officers are T. J. Yost, president; J. A. Ferguson, vice-president, and H. A. Yost, secretary and treasurer.

The Texas & Pacific Coal Co. paid a quarterly dividend of 2% in stock, Sept. 30. This compares with a cash dividend of 1½% declared in the previous quarter. President Marsten says that the present depression and the strike at the company's properties make it wise, in the directors' opinion, to conserve the cash resources.

Recent auction sales in New York included 100 shares of Tonopah Mining Co. of Nevada at \$7.37½ per share; 184 shares Coal Creek Mining & Manufacturing Co. at \$50, 364½ shares Poplar Creek Coal & Iron Co. at \$30; 20 shares Southern Mineral Land Co. at \$10, and \$200 first mortgage 6% bonds (due July, 1919) at \$100.

The Ohio Copper Co. is offering, at par, \$1,000,000 6% 10-year bonds, convertible into stock at par, \$10 per share. The total amount of bonds to be sold is \$2,000,000, but \$400,000 has already been taken by stockholders at par. The president of the Ohio Copper Co. is James MacFarlane, who succeeded F. A. Heinze, who remains a director of the company.

The New York office of the Miami Copper Co. of Arizona stated that nearly all the rights for the 100,000 shares of new stock have been taken up by the shareholders, and as the balance was underwritten by a syndicate, the company's treasury has been enriched to the extent of \$800,000. The expenses of the underwriting and getting out the new issue were taken from the total of \$1,000,000, the sum realized from the sale of 100,000 shares at \$10.

PITTSBURG SILVER PEAK MINING CO., NEV.

During the five months ending with August the bullion receipts amounted to \$419,256 from 49,754 tons of ore milled. Deducting expenses there remains a net profit of \$173,842.

## READING CO.

The reports of the three companies constituting the parent corporation for the fiscal year ending with June are briefly as follows:

Philadelphia & Reading Railway Co.—Receipts, \$42,664,595; operating expenses, \$25,458,296; net earning, \$17,206,299. Deducting additions and betterments of \$937,659, and fixed charges and taxes of \$9,923,000, leaves a surplus for the year of \$6,345,639.

Philadelphia & Reading Coal & Iron Co.—Receipts, \$38,014,420; expenses, \$34,304,802; net earnings, \$3,709,618. Deducting \$1,286,011 for new work at collieries, \$1,584,485 for interest at 2% on debt to Reading Co., \$514,350 for depletion of lands fund, and \$117,248 for fixed charges and taxes, leaves a surplus for the year of \$207,524.

Reading Co.—Income, \$7,592,333; expenses, \$97,190; net earnings, \$7,495,143. Deducting fixed charges and taxes of \$4,599,553, leaves a surplus for the year of \$2,895,590.

The accumulated surpluses of the three companies June 30 were as follows: Reading, 14,269,446; Philadelphia & Reading Railway, \$10,162,066; Philadelphia & Reading Coal & Iron Co., \$1,395,962; total, \$25,827,474.

The anthracite coal carried increased from 13,223,780 tons in 1906-1907 to 13,537,464 tons in 1907-1908, a gain of 313,683 tons, or 2.37%, while bituminous coal decreased from 11,190,250 tons to 10,816,439 tons, a loss of 373,810 tons, or 3.34%. The revenue from coal traffic decreased from \$18,730,189 to \$18,577,272, a loss of \$152,917, or 0.82%. During the year the total production of anthracite coal from the lands owned, leased and controlled by the Philadelphia & Reading Coal & Iron Co. was 11,914,154 tons, as compared with 11,655,100 tons during the previous year, an increase of 259,053 tons, or 2.22%. The company mined during the year 10,218,392 tons, an increase of 183,679 tons, or 1.83%; purchased 1,083,681 tons, a decrease of 24,166 tons, or 2.18%, and sold 10,992,975 tons, a decrease of 499,535 tons, or 4.35%, as compared with the previous year. The cost of coal mined and purchased was 1.5 cents per ton less than for the previous year, and the price realized on all sizes was 2.2 cents per ton higher, making a total increase in the net amount realized of 3.7 cents per ton.

Phosphate shipments from Tunis, Algeria, for July were 28,869 metric tons, chiefly to France and Italy.

The production of nitrate of soda in Chile for the first half this year amounted to 959,460 long tons, as against 863,706 tons in 1907.

# Latest Ore and Metal Market Reports and Prices

**Silver.**—Speculators have been more active recently, but in the absence of buying in quantity for consumption, the market is uninteresting.

The receipts of silver in London for the week of Sept 10 were £115,500 from New York, £7,000 from the West Indies, and £6,000 from Chile; total, £128,500. Exports were £9,000 to Calcutta and £1,100 to Bombay. According to Messrs. Pixley & Abell the shipments of silver from London to the East from Jan. 1 to Sept. 10 were as follows:

	1917.	1918.	Change.
India.....	\$1,149,764	\$4,654,250	L. \$2,504,486
China.....	1,000,000	1,000,000	I. 1,000,000
Straita.....	500,700	500,000	D. 700,000
Total.....	\$7,300,464	\$7,065,413	D. \$234,051

During August Great Britain imported £334,000 in silver from the United States, and £37,000 from France; total, £371,000. Exports for the month were £702,000 to India, £175,000 to the Straits, £49,000 to Russia, and £37,000 to France; total, £963,000.

Quotations for silver per fine ounce at New York and standard ounce (0.925 fine) at London, for the week of Sept. 23, were as below:

	New York.	London.
	Cents.	Pence.
Sept. 17.....	104 1/2	71 1/2
" 18.....	104 1/2	71 1/2
" 19.....	104 1/2	71 1/2
" 20.....	104 1/2	71 1/2
" 21.....	104 1/2	71 1/2
" 22.....	104 1/2	71 1/2
" 23.....	104 1/2	71 1/2

## MONTHLY AVERAGE PRICES OF SILVER.

Month	New York, Fine O.				London, Standard O.			
	1918		1917		1918		1917	
	High	Low	Ave.	Ave.	High	Low	Ave.	Ave.
Jan.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Feb.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Mar.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Apr.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
May.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
June.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
July.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Aug.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Sept.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Oct.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Nov.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Dec.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2
Year.....	104 1/2	104 1/2	104 1/2	104 1/2	71 1/2	71 1/2	71 1/2	71 1/2

Difference in domestic and foreign prices is explained by the fact that the New York quotations are per fine ounce, the London per standard ounce 1.000 fine.

**Copper.**—There is a temporary lull in the copper market, due in part to the uncertainty of the pending election. The larger consumers are not anxious to lay in supplies even at concessions in price; but speculators abroad are looking in anticipation of profits that are likely to be made when market quotations begin to fluctuate at a higher level. The only orders that are in the market from consumers are for small lots to fill current needs.

The exports of copper from North Atlantic ports from Sept. 1 to 21 amounted to 15,145 tons. Imports from Sept. 1 to 17 were 3,449 tons fine copper, 100 tons matte, and 4,200 tons ore.

Quotations for copper per pound at New York and per long ton (2,240 lbs.) at London for the week of Sept. 23 were as above.

	Lake	Dec.	Oct.	London Standard
Sept. 17.....	13 1/2	13 1/2	13 1/2	60 1/2
" 18.....	13 1/2	13 1/2	13 1/2	60 1/2
" 19.....	13 1/2	13 1/2	13 1/2	60 1/2
" 20.....	13 1/2	13 1/2	13 1/2	60 1/2
" 21.....	13 1/2	13 1/2	13 1/2	60 1/2
" 22.....	13 1/2	13 1/2	13 1/2	60 1/2
" 23.....	13 1/2	13 1/2	13 1/2	60 1/2

## MONTHLY AVERAGE PRICES OF COPPER.

Month	New York—Lake Copper.			London.		
	1918		1917		1918	
	High	Low	Average	High	Low	Average
January.....	14 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
February.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
March.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
April.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
May.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
June.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
July.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
August.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
September.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
October.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
November.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
December.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
Year.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2

## New York—Electricity Copper.

Month	1918			1917		
	High	Low	Average	High	Low	Average
	High	Low	Average	High	Low	Average
January.....	14 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
February.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
March.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
April.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
May.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
June.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
July.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
August.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
September.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
October.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
November.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
December.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
Year.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2

Quotations for electrolytic cathodes are 0.168 cent per lb. less than for matte, ingots and wire bars.

## R. Y.—Casting Copper.

Month	1918			1917		
	High	Low	Average	High	Low	Average
	High	Low	Average	High	Low	Average
January.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
February.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
March.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
April.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
May.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
June.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
July.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
August.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
September.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
October.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
November.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
December.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2
Year.....	13 1/2	13 1/2	13 1/2	60 1/2	60 1/2	60 1/2

**Tin.**—Business is of fair volume, and prices are fractionally lower. It is believed that this month's consumption in the United States will be in the neighborhood of 2,500 tons. From Sept. 1 to 22 the arrivals at North Atlantic ports were 21,975 tons; cargoes afloat, 1,320 tons.

Quotations for tin per pound at New York and per long ton for spot at London for the week of Sept. 23 were:

	New York.	London.
	Cents.	Pence.
Sept. 17.....	92 1/2	110 1/2
" 18.....	92 1/2	110 1/2
" 19.....	92 1/2	110 1/2
" 20.....	92 1/2	110 1/2
" 21.....	92 1/2	110 1/2
" 22.....	92 1/2	110 1/2
" 23.....	92 1/2	110 1/2

## MONTHLY AVERAGE PRICES OF TIN, NEW YORK

Month	1918			1917		
	High	Low	Average	High	Low	Average
	High	Low	Average	High	Low	Average
Jan.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
Feb.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
Mar.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
Apr.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
May.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
June.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
July.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
August.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
September.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
October.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
November.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
December.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2
Year.....	36 1/2	36 1/2	36 1/2	41 1/2	41 1/2	41 1/2

**Lead.**—So little business has been done that holders have shaded prices at New York to \$4.45 to \$4.50 per 100 lb. In London spot Spanish lead closed on Sept. 23 at £13 1/2 3d per long ton (£2.83 per 100 lb.). English lead is worth 25 6d (61 cents) per ton more than Spanish metal.

Receipts of lead at St. Louis for the week of Sept. 19 were 32,810 pigs; shipments, 39,470 pigs.

## MONTHLY AVERAGE PRICES OF LEAD.

Month	New York			London.		
	1918		1917		1918	
	High	Low	Average	High	Low	Average
Jan.....	3.00	2.95	2.97	4.00	4.00	4.00
Feb.....	3.00	2.95	2.97	4.00	4.00	4.00
Mar.....	3.00	2.95	2.97	4.00	4.00	4.00
Apr.....	3.00	2.95	2.97	4.00	4.00	4.00
May.....	3.00	2.95	2.97	4.00	4.00	4.00
June.....	3.00	2.95	2.97	4.00	4.00	4.00
July.....	3.00	2.95	2.97	4.00	4.00	4.00
Aug.....	3.00	2.95	2.97	4.00	4.00	4.00
Sept.....	3.00	2.95	2.97	4.00	4.00	4.00
Oct.....	3.00	2.95	2.97	4.00	4.00	4.00
Nov.....	3.00	2.95	2.97	4.00	4.00	4.00
Dec.....	3.00	2.95	2.97	4.00	4.00	4.00
Year.....	3.00	2.95	2.97	4.00	4.00	4.00

## Joseph Lead Ore.

Month	1918			1917		
	High	Low	Average	High	Low	Average
	High	Low	Average	High	Low	Average
Jan.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Feb.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Mar.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Apr.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
May.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
June.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
July.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Aug.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Sept.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Oct.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Nov.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Dec.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50
Year.....	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50	\$20.50

**Silver.**—After touching the highest prices—\$4.77 1/2 to \$4.82 1/2 per 100 lb. at New York—since February last, the market closes weak at \$4.67 1/2 to \$4.75 on Sept. 23. In London good ordinary brands of silver were quoted on Sept. 23 at £19 12s 6d per long ton (\$1.35 per 100 lbs.).

St. Louis silver receipts for the week of Sept. 19 were 72,560 slabs; shipments, 99,750 slabs.

## MONTHLY AVERAGE PRICES OF SELLER.

Month	New York			London		
	1918		1917	1918		1917
	High	Low	Ave.	High	Low	Ave.
Jan.....	4.00	3.90	3.94	4.00	3.90	3.94
Feb.....	4.00	3.90	3.94	4.00	3.90	3.94
Mar.....	4.00	3.90	3.94	4.00	3.90	3.94
Apr.....	4.00	3.90	3.94	4.00	3.90	3.94
May.....	4.00	3.90	3.94	4.00	3.90	3.94
June.....	4.00	3.90	3.94	4.00	3.90	3.94
July.....	4.00	3.90	3.94	4.00	3.90	3.94
Aug.....	4.00	3.90	3.94	4.00	3.90	3.94
Sept.....	4.00	3.90	3.94	4.00	3.90	3.94
Oct.....	4.00	3.90	3.94	4.00	3.90	3.94
Nov.....	4.00	3.90	3.94	4.00	3.90	3.94
Dec.....	4.00	3.90	3.94	4.00	3.90	3.94
Year.....	4.00	3.90	3.94	4.00	3.90	3.94

## Prices-Current of Minerals, Ores, Metals, Chemicals, Etc.

Deliveries are f. o. b. or c. i. f. New York, unless stated otherwise.

(See also Market Reports)

Acetic-Acetic, com'l, 100 lb.	52.00	Coke-Chicago		Phosphoric-Acid 14 to 15% unit.	50.00 to 56.75
Chem. pure, 100 lb.	4.00	Connersville, 72-hour	94.00	Florida Rock, f. o. b. Fernandez, long ton	2.25 to 2.75
White, 25 to 30% water	2.87 1/2 to 3.00	Virgin, 48-hour	4.00	land phosphate, f. o. b. Fernandez	14.00 to 16.00
Boric, New York, lb.	1.10 to 1.15	West Virginia, 72-hour	4.00	c. i. f. Europe	12.00 to 14.00
Carbonic, 25 lb. can	1.10 to 1.15	48-hour	4.10	Tennessee rock, f. o. b. c. i. f. Europe	2.25 to 2.75
Hydrochloric, 35 lb. can	1.10 to 1.15				
Hydrofluoric, 40 lb. can	2.00 to 2.50				
Hydrocyanic, 40 lb. can	2.00 to 2.50				
Hydroiodic, 40 lb. can	2.00 to 2.50				
Muriatic, Denver, 10 to 12% (tank cars)	1.10 to 1.15				
Oxalic, New York, lb.	1.10 to 1.15				
Sulphuric, Denver, 60 (tank cars), 100 lb.	1.10 to 1.15				
60% (carboys)	1.10 to 1.15				
60% (carboys)	1.10 to 1.15				
60% (barrels)	1.10 to 1.15				
Sulphuric, N. Y., 50% (bulk), short ton	11.75 to 12.00				
60% (carboys), 100 lb.	1.10 to 1.15				
60% (barrels)	1.10 to 1.15				
Tartaric, powdered, New York, lb.	1.10 to 1.15				
Alcohol-Grain, gal.	2.01 to 2.03				
Wood, 10 to 15% gal.	4.17 to 4.21				
Purified	4.10 to 4.14				
Denatured	4.10 to 4.14				
Aluminum-10% I. Ingot, lb.	32.50 to 33.00				
Sulphate, 100 lb.	1.00 to 1.05				
Alum-Lump, 100 lb.	1.75 to 1.80				
Ground	1.50 to 1.55				
Powdered	3.00 to 3.25				
Granules	3.00 to 3.25				
Ammonia-Aqua-Denver, 100 lb.	4.00 to 4.50				
Anytown, Denver, (cylinder)	3.30 to 3.50				
Anytown, New York, (cylinder)	3.30 to 3.50				
Carbamide, lb.	2.75 to 3.00				
Muriatic, lump, lb.	2.75 to 3.00				
granular, coarse	2.75 to 3.00				
white	2.75 to 3.00				
Sulphate, 10 to 20% gas liquor, 100 lb.	3.00 to 3.50				
Antimony-Metal, lb.	2.75 to 3.00				
London, long ton	2.00 to 2.50				
Ore, 30% to 40% lb.	2.00 to 2.50				
Arabic-White, lb.	2.75 to 3.00				
Red	2.75 to 3.00				
Asbestos-Canadian f. o. b. mine, short ton	3.00 to 3.50				
Crude No. 1	3.00 to 3.50				
Crude No. 2	3.00 to 3.50				
Fiber	4.00 to 4.50				
Paper stock	2.50 to 3.00				
Nitrate-Nitrate, lb.	2.00 to 2.50				
Sulphate	2.00 to 2.50				
Chloride, ton	2.00 to 2.50				
Silver-Domestic, prime, short ton	17.00 to 18.00				
OR color	17.00 to 18.00				
Sluam-Metal, lb. New York	1.75 to 1.80				
London	1.75 to 1.80				
Bleaching Powder-Domestic or foreign	1.10 to 1.25				
100 lb.	1.10 to 1.25				
Bone Ash-100 lb.	2.00 to 2.50				
Bone Black-100 lb.	12.00 to 15.00				
Borax-Lb.	2.00 to 2.50				
Bor-Carat	2.00 to 2.50				
Bromine-Domestic, prime, ton	22.00 to 24.00				
Rail, 100 lb.	1.00 to 1.25				
Flour	2.00 to 2.50				
Flowers, sublimed	2.00 to 2.50				
Bromine-Lb.	2.00 to 2.50				
Calcium-Sulphate, f. o. b. Cleveland, O., lb.	1.00 to 1.25				
Calcium-Acetate, gray, 100 lb.	2.00 to 2.50				
Carbon-Drill, best, carat	70.00 to 80.00				
Carbonyl-Nitrate-Fair	1.00 to 1.25				
Powdered, lb.	1.00 to 1.25				
Crude	1.00 to 1.25				
Cement-Portland, bbl.	1.00 to 1.25				
Cerulite-Yellow, lb.	1.00 to 1.25				
White	1.00 to 1.25				
Chalk-Ton	1.00 to 1.25				
China Clay-Domestic, short ton	1.00 to 1.25				
Foreign	1.00 to 1.25				
Chrome Ore-40% long ton	15.00 to 18.00				
Canadian concentrate, 90% short ton	15.00 to 18.00				
Metal pure 90-95% lb.	15.00 to 18.00				
Cord-Chicago	1.00 to 1.25				
Cartwright, at mine, lump or egg	1.10 to 1.25				
Screenings	1.10 to 1.25				
Springfield, lump and egg	1.10 to 1.25				
egg	1.10 to 1.25				
mine run	1.10 to 1.25				
Screenings	1.10 to 1.25				
Spring Valley, lump	1.10 to 1.25				
egg	1.10 to 1.25				
egg	1.10 to 1.25				
Screenings	1.10 to 1.25				
King's mine run	1.10 to 1.25				
lump	1.10 to 1.25				
Screenings	1.10 to 1.25				
Indiana-Mellin and Greene Counting	1.10 to 1.25				
egg and lump	1.10 to 1.25				
Screenings	1.10 to 1.25				
Brant Rock, upper vein	1.10 to 1.25				
West Virginia-New River and	1.10 to 1.25				
mine run	1.10 to 1.25				
lump and egg	1.10 to 1.25				
Washington, f. o. b.	1.10 to 1.25				
14-in. lump	1.10 to 1.25				
Cobalt-Unterschied	1.10 to 1.25				
Oxide, N. Y., lb.	1.10 to 1.25				



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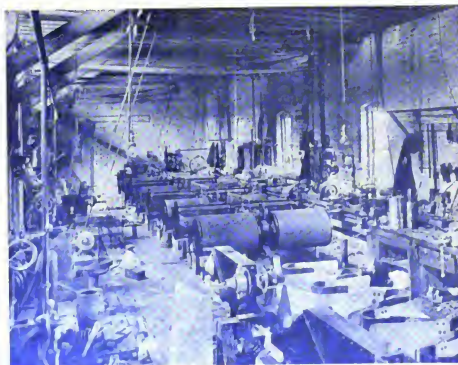
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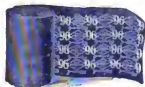
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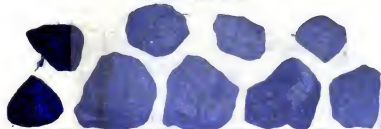
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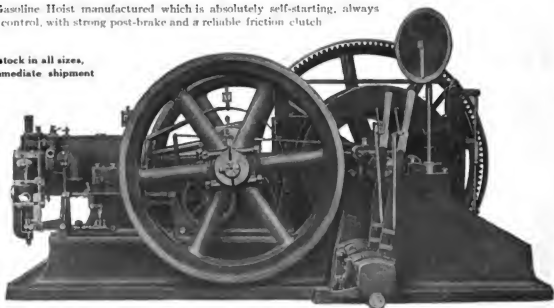
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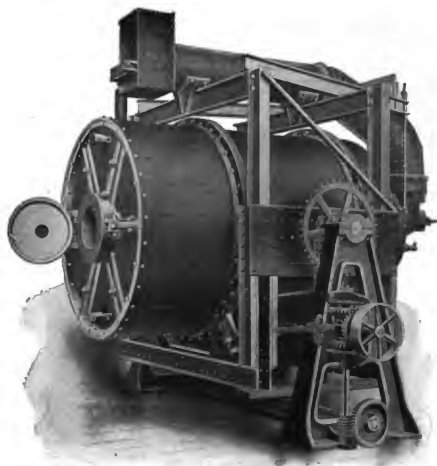
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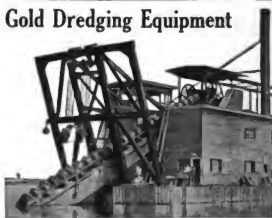
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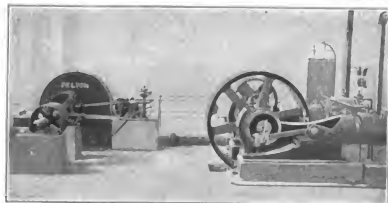
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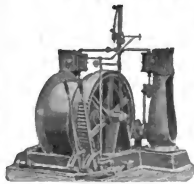
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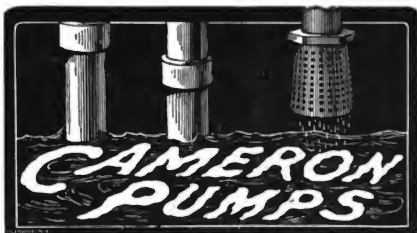
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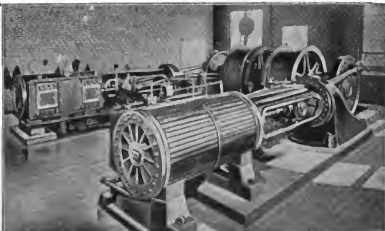
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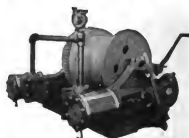
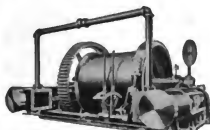


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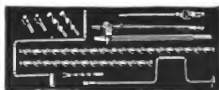


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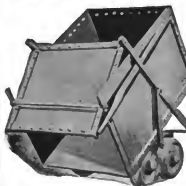
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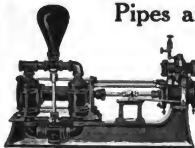


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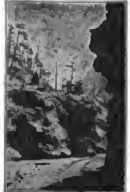
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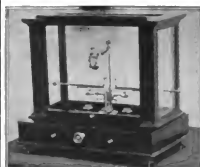
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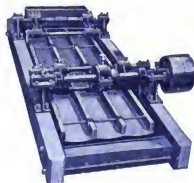
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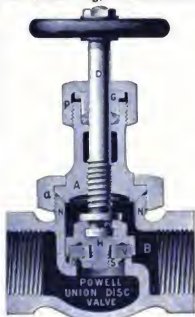
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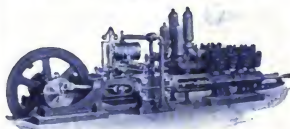


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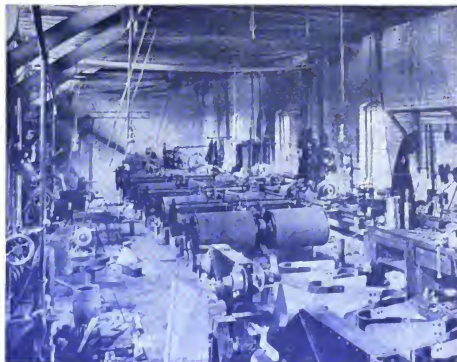


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